RUBBER and PLASTICS WEEKLY

VOLUME 141 NO. 12 SEPTEMBER 16 1961 ONE SHILLING

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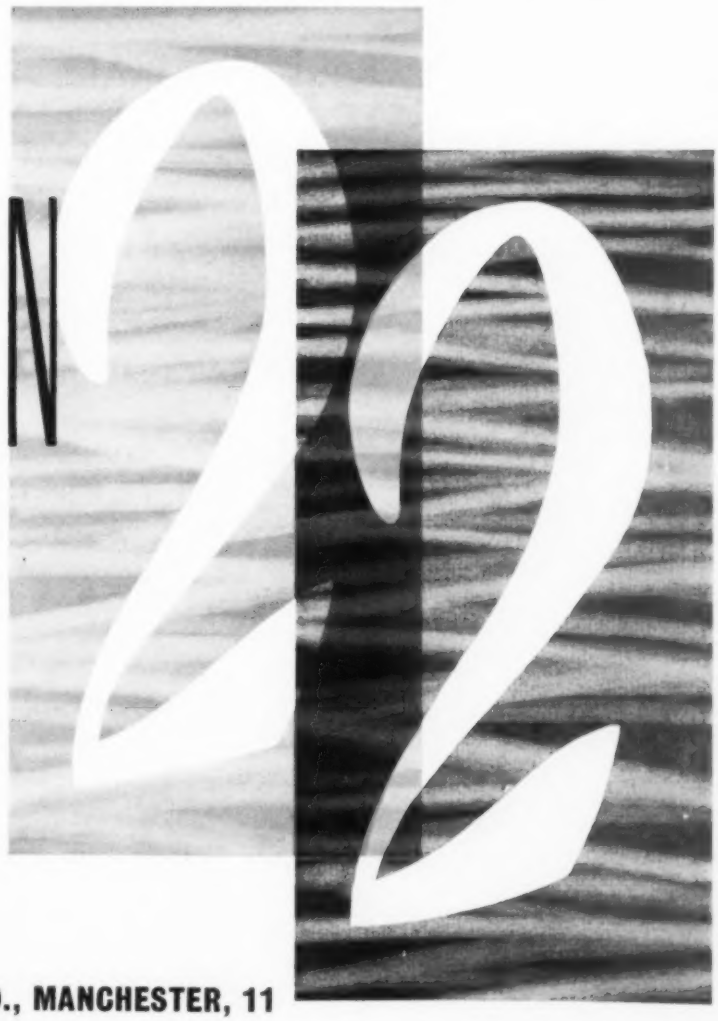
By using this British made catalytic plasticiser breakdown time can be reduced and production capacity increased.
It can be used with natural rubber or GR-S and is recommended for tyres, cables, sponge rubber and any type of compound where increased plasticity and improved processing are desired.



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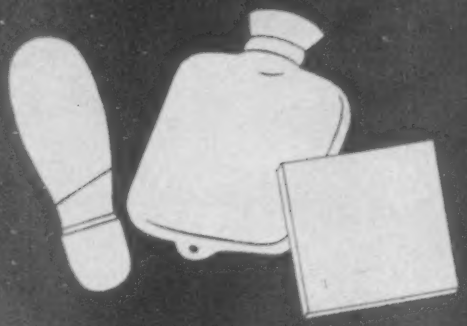
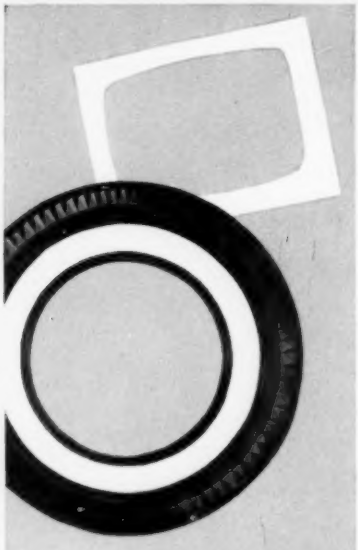
American Liaison and Service Branch: British Anchor Chemical Corporation, 366 Madison Avenue, New York 17, N.Y.

SELECT A NAUGATUCK ANTIOXIDANT



OCTAMINE

A low-cost, general-purpose antioxidant, it is equally effective in black and non-black compounds, being almost non-staining and non-discolouring. It is specially recommended for use in Neoprene, where, in addition to providing antioxidant protection, it also provides protection against bin scorch, and is effective in nitrile rubber, where it acts as a stabilizer during hot temperature blending with plastics.



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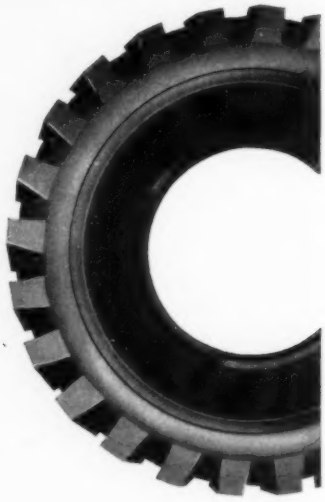
An extremely efficient general-purpose antioxidant, its low price and effectiveness at very low concentrations make this antioxidant remarkably economic in use. Only very moderately staining and discolouring, it is recommended for maximum protection for both natural and synthetic rubbers. Outstanding for heat protection.



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A low-priced, non-staining, non-discolouring antioxidant, suitable for use in all white and light-coloured applications. Readily forming a stable emulsion, it is particularly suitable for use in latex, and in latex foam it is most effective in minimising compression set.

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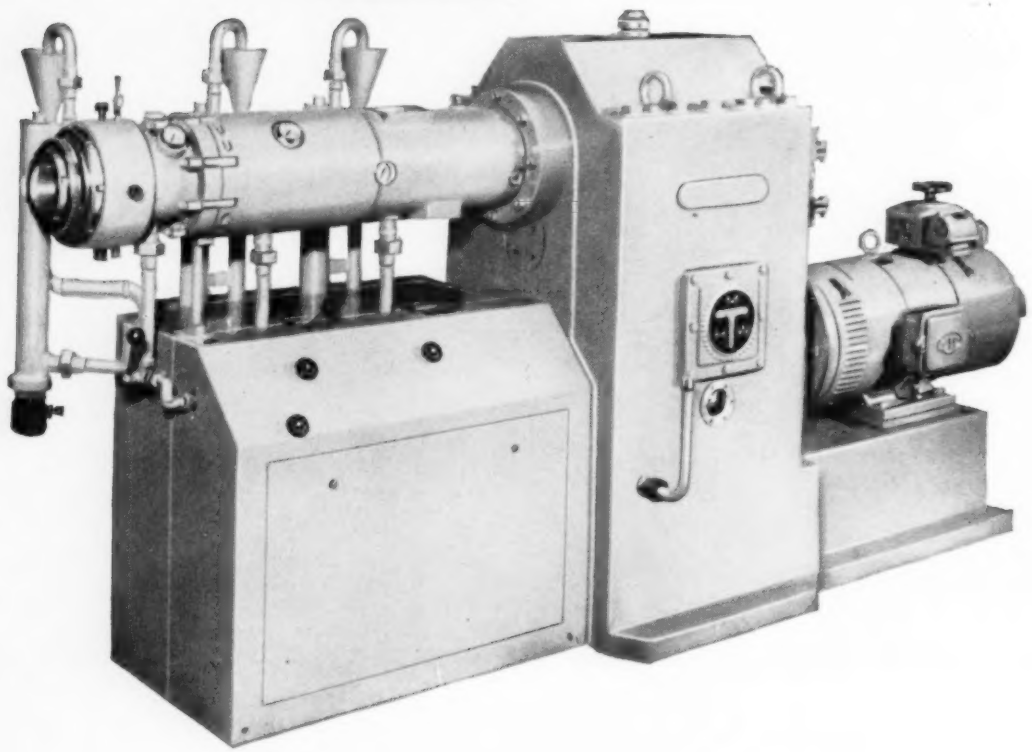

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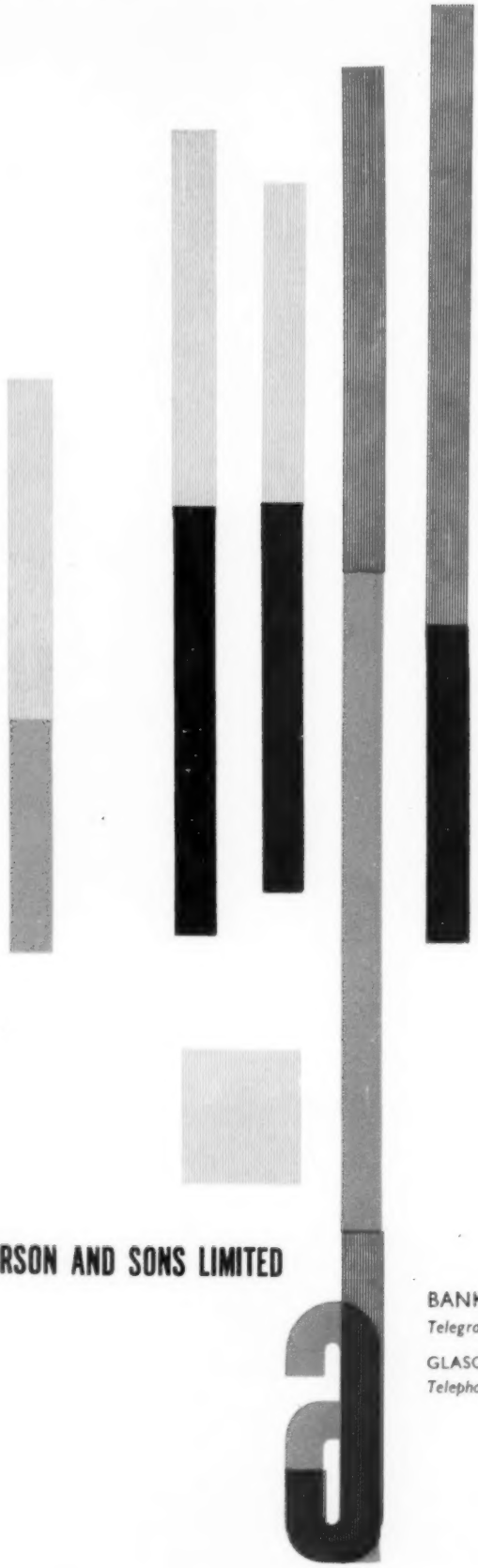

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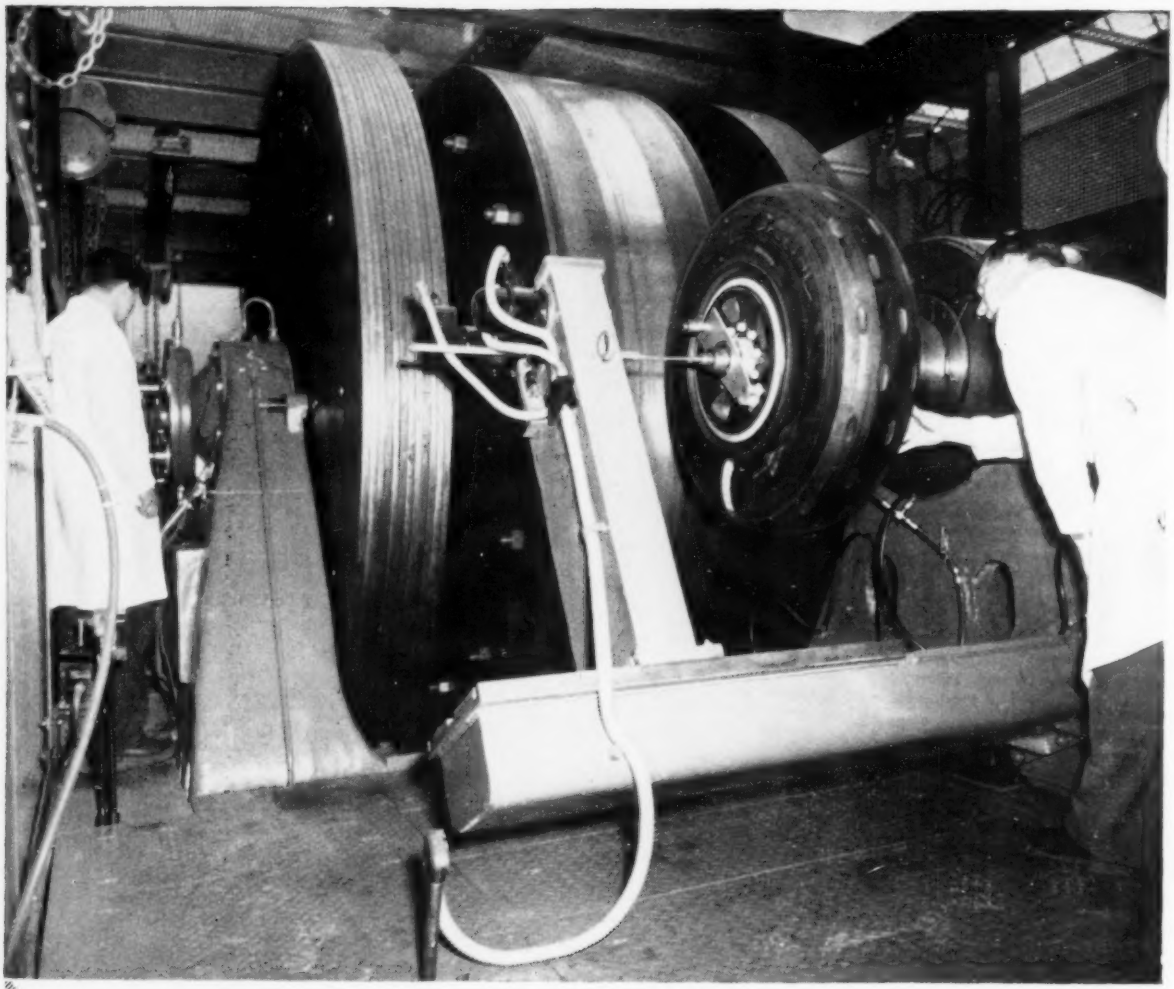

This brake and tyre testing equipment at a Dunlop factory incorporates drives and control equipment by 'ENGLISH ELECTRIC' The dynamometer test rig is driven through a clutch and speed reducing gear box by an 'ENGLISH ELECTRIC' Ward-Leonard controlled D.C. motor rated 400 h.p. 1,040 r.p.m. Control of the complete brake test cycle is fully automatic from commencement of the fly-wheel run-up to the point where it is brought to rest by the brake under test.

Publication PS/131, 'Electrical Drives in the Rubber Industry, will be sent on request.

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drives for the rubber industry

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PS.43

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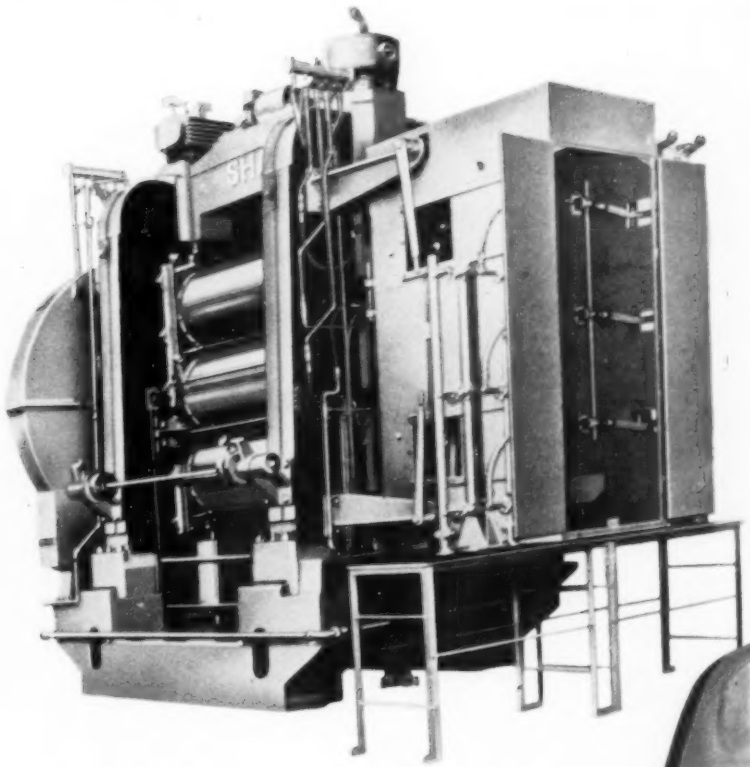
research · design · quality engineering



A507

A Francis Shaw three-roll calender – 72 x 28 inches – with Shaw standard features

- All types of roll configuration
- Full supporting auxiliaries
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OVERSEAS AGENTS THROUGHOUT THE WORLD

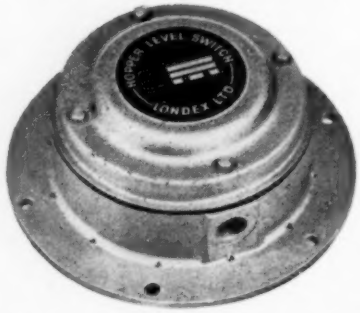
P4393

LONDEX

New

HOPPER LEVEL SWITCH

Types STA and SEN



This switch, which is ***40%*** ***cheaper than its predecessor*** is designed to operate electrical contacts when bulk materials press against the diaphragm, can be used for controlling the level in a hopper or similar container: indicating the height of material by controlling signal lamps or an audible warning.

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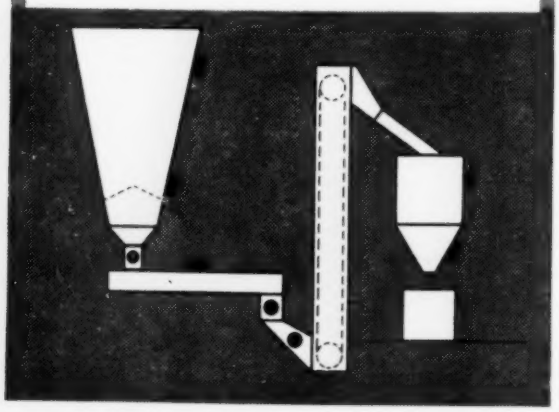

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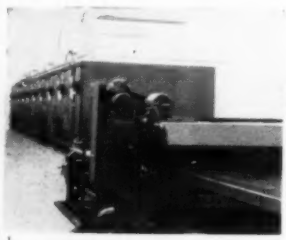

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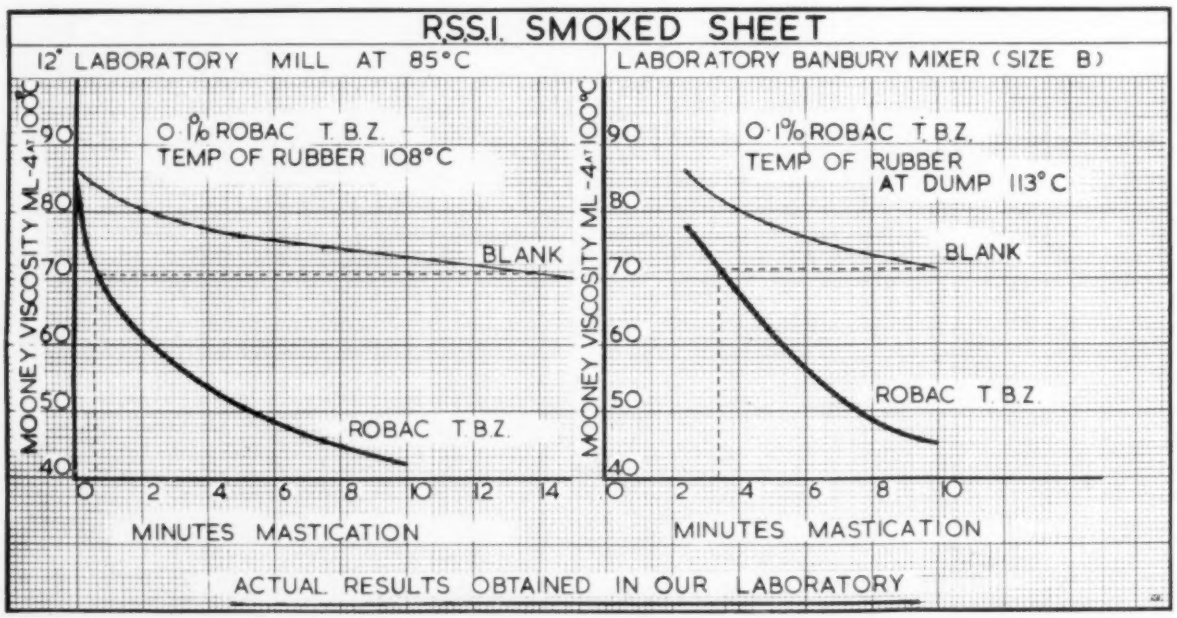
✳REDUCES BREAKDOWN TIME ✳INCREASES PRODUCTION



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M-W 76

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Volume 141 IN ITS 78th YEAR No. 12

September 16 1961

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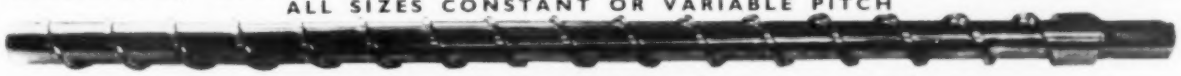

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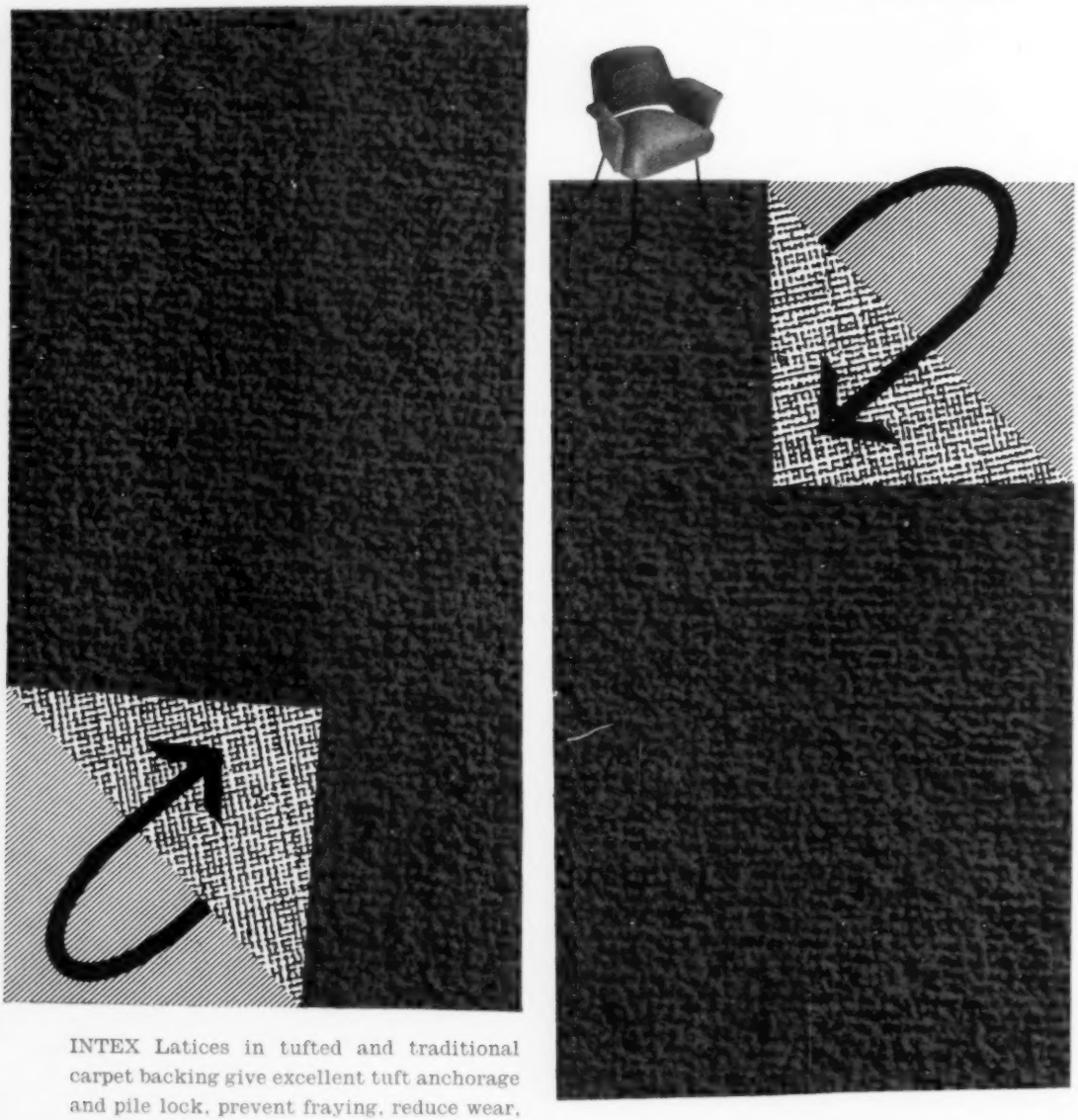

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ISR

NOTES of the WEEK

Building Information

IN spite of a number of spectacular applications, the growth of plastics in the building industry is likely to be steady rather than sensational over the next few years. The Shell South Bank building and polyester/glass signal boxes for British Railways are first-class examples of what can be done with plastics, but they are cases where the company has sold the idea of plastics to itself: this may be none too easy, but it is more difficult to sell to the independent architect and builder who is firmly entrenched in conventional materials. Looking at the situation from the architect's point of view, one of the difficulties is the lack of adequate information. Writing in our building issue earlier this year (April 29), a prominent architect pointed out that when an architect is preparing his design he wants to have readily available to him a vast amount of data relative to all materials under consideration; he felt that this data was 'sadly lacking' in the plastics field.

The data must not only be presented: it must be presented in a clear, readily accessible form. This becomes more important every day as the range of materials and techniques increases. In common with other users of information, the architect looks for a similar pattern in all technical publications, so that he can adopt a standard system of filing and classification. Architects have discussed for some time what this pattern should be. Two conclusions have been reached: first, that the SfB system of classification should be adopted, and second, that all literature should be prepared to the international A4 size — 11¾in. × 8¼in. (British Standard 1311). Any plastics manufacturers preparing information for architects would do well to study these conclusions.

One firm that has successfully adopted the SfB system and the A4 paper size is the UAM group, which recently formed a joint subsidiary with Thermo-Plastics Ltd. to exploit the opportunities for plastics in the building field. The SfB system, which originated in Sweden, was adopted in 1959 by the International Council of Building and has since been approved by bodies such as RIBA and the Ministry of Works. It can be handled by a large organization — or by one man. It pre-classifies all technical information with alphabetical and numerical symbols, which are grouped for easy reference and simplicity of filing. These symbols comprise three tables: functional elements; construction; materials. The system aims to group all technical information in the order in which it will be used during the natural progress of the job plan and specification. The system will be described in detail in the SfB/UDC Building Filing Manual to be published by RIBA later this year.

Standardization Stimulation

NEEDLESS to say, rubber and plastics manufacturers would welcome a similar attempt at classifying information presented to them by raw material manufacturers. In recent years there has been a welcome decrease in the tendency to produce technical data sheets in a manner that present the product favourably to the detriment of clear information. But data sheets still come in all shapes and sizes, and there is a considerable variation in the presentation of information. In this year's foundation lecture of the Institution of the Rubber Industry, J. W. Denson stated that it had been estimated by J. M. Buist that in 1950 rubber compounders alone were able to choose their ingredients from a list totalling 1,665. In 1957 he estimated that a list covering the same range would add up to 2,200 — now it must be well over the 2,500 mark. The advantages of putting this wide range in order are obvious from the manufacturer's point of view. Instead of being grouped in assorted, space-taking, files by companies, standardized divisions based on material or function could be devised. But, clearly, there would also be advantages for the raw material manufacturer or supplier. His data would be easier to assemble and more quickly prepared — and assimilated. In the present situation, the wide variety of materials means that a large number of them are not evaluated at all by some manufacturers. They stand the best chance if they are backed with frank, full, clearly-expressed technical information — the preparation of which would be stimulated by standardization.

Modern Factices

THE announcement in last week's *RPW* that Newton Heath Technical College, Manchester, has arranged an autumn series of six lectures on 'Modern Factices and Present Uses in the Rubber Industry' has aroused much interest. Six lectures is an indication of the importance of the subject and we are informed that even so the treatment had to be compressed. The series will be introduced by Dr W. F. Watson, director of research, RAPRA, and from the lecture titles and lecturers' names it seems evident that the warning to 'avoid substitutes' is no longer fashionable.

NEWS *Briefs*

£3m. BUDAPEST RUBBER PLAN — BRNO DISPLAY
JAPAN PROPYLENE PLANT FOR USSR — RUBBER
ALUMINIUM LAMINATE—BFG WORKERS RETURN

●**United States** — The Goodyear Tire and Rubber Co. has announced a new synthetic rubber which, it is claimed, in tests gave 35% more tyre tread and held promise of a nearly double tyre life. The rubber goes into commercial production in October at Goodyears new $20m. plant at Beaumont, Texas. The material named budene is made from butadiene and is currently processed blended with SBR.

●**Canada** — Speakers at the Chemical Engineering Conference arranged by the Chemical Institute of Canada include several from rubber and plastics companies, among them Union Carbide, Dow Chemicals, Polymer Corporation and Du Pont. The conference will be held in Toronto on November 6, 7 and 8.

●**Czechoslovakia** — The International Trade Fair at Brno, which opened on September 10, includes an official British exhibit provided by the Board of Trade. Over 30 British firms whose products range from electronic instruments to printing equipment are exhibiting independently. These include I.C.I. Ltd. and Peco Machinery Sales Ltd.

●**United States** — According to W. G. Reynolds, executive vice-president in charge of research for the Reynolds Metals Co., Richmond, Virginia, a process has been developed for the direct vulcanization of rubber on to aluminium sheet and foil. This yields a material combining the surface toughness, corrosion resistance and insulating properties of aluminium with the flexibility of rubber and has been made possible by a special aluminium coating developed by the packaging research division of the company.

●**France** — Phoenix-France, a company with a capital of NF5m., has been created in Paris by the German firm, Phoenix-Gummiwerke for the manufacture and sale of various rubber and plastics products.

●**Hungary** — One hundred million forints — about £3m. — are being spent this year on the first stage of a reconstruction and expansion programme at the Budapest Rubber Works. By 1965, when the work should be completed, production of vehicle tyres there should reach 800,000 annually, double the present output, managing director Pál Somogyi has announced. Mr Somogyi said that more synthetic rubber is being used, and that average tyre-life has now been raised to 19,000 kilometres.

●**United States** — The threat of a car industry strike has cast a shadow over the US rubber market with only slight buying by the factories. Most of General Motors' 129 plants throughout the country came to a standstill early this week as the United Auto Workers Union ordered its 325,000 members employed by the company to strike. The strike is reported to be caused mainly by discontent about working conditions and other non-economic issues.

●**Canada** — An increase in tariff protection on Commonwealth-made rubber belting, including conveyor belts, has been recommended to the Canadian Parliament by the Finance Minister. Imports of belting from Britain have increased in recent years while Canadian producers with declining exports and excess capacity, had higher costs than British factories. It was proposed that the British preferential tariff be raised from 7½% to 15%. The rate on imports from most-favoured-nation trading partners such as the US will remain at its present 20% level.

●**Japan** — Russian trading organizations have ordered a propylene plant from Japan which will have a capacity of 10,000 tons. The order follows the Soviet Trade Fair in Tokyo earlier this month. Orders have also been placed for two rayon plants with a total capacity of 24,000 tons and a 7,000 ton acetate plant.

●**Hungary** — A report from Hungary says that private craftsmen, working either in small co-operative groups or individually, are producing 8% of the country's industrial output. Many of them run light industrial workshops and the activities include the making-up of plastics materials into consumer goods for both home consumption and export.

●**United States** — Members of United Rubber Workers Union returned to work on Tuesday (September 12) at the B. F. Goodrich Co.'s plant in Miami, Oklahoma, ending a 46-day strike. The workers accepted a list of 29 changes in the union's supplemental contract with the company, including a wage increase of from 2¼–9 cents an hour for tyre builders, receiving clerks and conveyor line dispatchers. Some 1,600 union members, including 1,350 production workers, were stood off during the strike.

'How the hell do I know why none of the king's horses nor none of the king's men had any polystyrene cement?'
— 554

Ten Years at Fawley

20% OF ESSO INVESTMENT IN POLYMER FEEDSTOCK

THE Esso Petroleum Co. Ltd.'s refinery at Fawley, Southampton, celebrated the tenth anniversary of its official opening on Tuesday (September 12).

Since the opening the range of products made at Fawley has been expanded rapidly. Originally confined to petrol, paraffin, diesel and fuel oils, it now includes jet fuels, lubricants — and petroleum chemical feedstocks. The latter has made Fawley into an important centre for the rubber and plastics raw materials industry.

In fact Esso disclosed on Tuesday that nearly 20% of the company's investment there is devoted to the production of feedstocks for the manufacture of synthetics (this figure includes detergents as well as rubber and plastics).

Companies fed from Fawley include the International Synthetic Rubber Co. Ltd., Monsanto Chemicals Ltd. and Union Carbide Ltd. ISR, which receives butadiene piped from the refinery, now has a capacity of 100,000 tons of SBR at its Hythe plant, including high solids latex.

Largest in Europe

The current capacity of Monsanto's polythene plant is 17,000 tons; this is now being expanded to a figure of 25,000 tons a year by 1963.

The second steam cracker at Fawley which is expected to be completed by the end of this year, will be the largest of its kind in Europe. This £5½m. unit will produce ethylene, propylene and butadiene; part of the ethylene will be piped across country to I.C.I.'s complex at Severnside.

Esso itself is to invest in polymers at Fawley. A 30,000 ton, £4.3m. butyl rubber plant is expected to be completed there by late 1962. The first plant to produce butyl in the UK, the company says that its capacity will be adequate to meet UK requirements for some years to come, and will provide quantities for export.

£22,000 an Employee

Built on a site adjacent to a small existing refinery, the original extension of the Fawley refinery was begun in 1949. By the time this stage was completed — several months ahead of schedule — investment amounted to some £37m. Since then, expenditure on new capital plant and equipment has averaged £5½m. a year, and by the end of 1961 the total capital expenditure will have reached over £80m., representing an investment of over £22,000 per employee.

The throughput of the refinery has increased from six to over 11m. tons of crude oil a year. During the last ten years 85m. tons of crude have been processed — an average of 5,000gall. a min.

Tanker traffic at the refinery's marine terminal now represents about a third of all ships using the port of Southampton. Since the *Esso Fawley* discharged the first cargo of crude oil at the jetty in 1951, nearly 37,000 ships have berthed there.

ISR Appointment

The International Synthetic Rubber Co. Ltd. of Hythe, has announced an important appointment. With effect from October 1, K. G. Burridge, the present works manager, will become director of research and development.

K. Wyllie will become works manager.

Last month ISR announced that it had been appointed sole UK agent for Firestone's Diene polybutadiene rubber. ISR has also sole manufacturing rights for the material in the UK. The company is already marketing the material.

Amalgamation Approach

The Majedie (Johore) Rubber Estates has offered to acquire the £107,900 capital of Brae Holdings on a share-exchange basis of seven Majedie 1s. units for every four Brae 2s. shares. The amalgamation approach was made by Brae, and its directors recommend acceptance.

If the offer becomes effective, Majedie will increase its issued capital by £94,413 to £205,529, and Brae holders will acquire 45.9% of Majedie's capital.

Difficult to Negotiate

Brae's investments are mostly in quoted rubber and tea companies. The directors of the company point out that the main advantage of accepting the offer is that holders will become members of a larger company which is quoted on the London Stock Exchange. The present shares have no market and are difficult to negotiate.

Artrite Closes London Office

The recent move of the Artrite Resins Ltd. sales office from London to Camberley has resulted in improved service to customers.

The company has now decided to concentrate all departments at Camberley. The London office in Kingsway has been closed and all personnel moved to Stanhope Road, Camberley, Surrey.

Blow Moulding Cuts Refrigerator Costs

A STEP towards a 'substantial decrease in the production costs of refrigerators' is claimed by Emerson Walker Ltd. — manufacturers of large machine tools for blow moulding plastics.

The firm's development engineers were given the task of studying refrigerators objectively and determining how the low-cost blow moulding technique could be applied to their manufacture, in the size range of 4 to 10 cu. ft. As a result the company says that it can reduce the refrigerator to a concept of 'two hollow polythene or polypropylene boxes and a few items of hardware'.

The manufacturing process consists of blow moulding a refrigerator-sized plastics box. Then another box, slightly smaller, is produced by the same process. One side is sliced off each box and the two boxes are nested to form the inner and outer casings of the refrigerator.

Space between the casings is insulated by the introduction of foamed plastics, hinges are fitted and the cut-off sides, similarly nested and insulated, form the door. A magnetic lock is added, and the refrigerator is then ready to receive the freezing unit.

A number of large firms are in consultation with Emerson over the production of low-cost refrigerators by this method.

Packaging Order

Orders worth £375,000 were received at the International Packaging Exhibition, which ended on Friday September 15, by Felber Jucker and Co.

A substantial part of these orders consist of sachet filling and sealing machines for pvc tube, and printing and welding machines.

The machines, bought by Woodham Holdings, are manufactured by the Société d'Etudes et d'Applications Industrielles de Brevet.

●A full report on the Packaging Exhibition, which was previewed in the *RPW* September 2 issue, appears on page 438.

UK Tyre Machinery for Russia

ANOTHER CONTRACT FOR SIMON HANDLING ENGINEERS

SIMON Handling Engineers Ltd., Cheadle Heath, Stockport, has signed a contract with Techmashimport, the Soviet Trade Organization, valued at over £1.8m.

The contract is to supply complete machinery and equipment for handling, storing and automatic weighing of basic raw materials for tyre-making in a new tyre factory of Russian design.

The site for this plant is said to be at Voljsk, near Stalingrad.

After nine months of negotiation, the contract was signed in Moscow by J. V. Goddard, assistant managing director of Simon Handling Engineers.

With contracts already received from Techmashimport for existing tyre factories, this puts the Stockport company's total orders received during 1961 for this type of work for the Soviet Union to beyond £2m.

The tyre plant field is continuing to be an increasingly fruitful one for UK manufacturers exporting to the East.

Simon Handling Engineers is a member of the consortium Rustyfa Ltd., which recently supplied £14m. worth of engineering service plant and rubber and tyre manufacturing machinery to the Dneipropetrovsk plant near the Dneiper river in the Ukraine.

54lb. a Worker

This plant — claimed to be the most mechanized tyre plant in Europe — went on stream last month (*RPW* August 5, 202). It is said to be the first to have complete mechanization of all rubber mixing processes by computers; each worker is claimed to produce 54lb. of finished product an hour.

Member companies of the Rustyfa consortium besides Simon Handling are Mather and Platt Ltd., Crompton Parkinson Ltd., David Bridge Ltd., Francis Shaw Ltd., and Lancashire Dynamo Holdings Ltd. Dunlop Advisory Services Ltd. is consultant to the consortium.

●Only last week the Worcester firm of Heenan and Froude announced a tyre machinery order for the East — the company has built a number of tyre test plants for a Roumanian factory.

P. W. Howard

P. W. Howard, one of the outstanding figures in the rubber industry — he is president of RAPRA and a past president of the FBRAM — has retired from his position as deputy chairman of BTR Industries Ltd.

His work for RAPRA and the FBRAM will continue.

●See Men and Matters, page 444.

PTFE Tape

A recent addition to the range of ptfe products manufactured by Turner Brothers Asbestos Co. Ltd., Rochdale, is pipe thread sealing tape.

A party of Malayan Ministers, who visited the Natural Rubber Producers Research Association at Welwyn Garden City earlier this month, examining a trailer used for experiments on tyre abrasion. *Left to right:* **Dr L. Bateman, Director of NRPRA; Tan Siew Sin, Minister of Finance; Sir Geoffrey Clay, Controller of Rubber Research; Dr A. Schallamach and Dr K. A. Grosch, NRPRA; Yeo Beng Poh, Malaya House; Tuan Haji Mohamed Khir Johari, Minister of Commerce and Industry; Liew Sip Hon, Controller of Export Commodities Division of the Treasury**

Pressure Former for BX Lawford Place

A new fully-automatic packaging machine — the Jotymat 300 — is to be installed at the BX Plastics Ltd. research station at Lawford Place, Essex. The company says that the new machine, which was shown at Interplas this year, will assist in the 'evaluation and development of plastics film and sheet for automatic packaging applications'.

The Jotymat 300 is a pressure forming machine and is capable of producing 3,600 complete, trimmed units every hour. It can be fed with either roll or sheet material. The Lawford Place machine is now being exhibited at the Manchester Catering Exhibition (closes September 23) where it is fabricating BX Plastic's Bextrene toughened polystyrene sheet.

The machine is made by Robert Sendler, Recklinghausen, Germany, and the UK agent is Richard Hall Ltd., Hawthorn Walk, Wilmslow, Cheshire.

GRP Factory for Grangemouth

BCM Plastic Developments Ltd. is to manufacture glass fibre and plastics products in a new factory at Grangemouth for which approval has just been given. The Town Council was given authority by the Dean of Guild Court to build the £21,000 factory on a site at the former airfield.

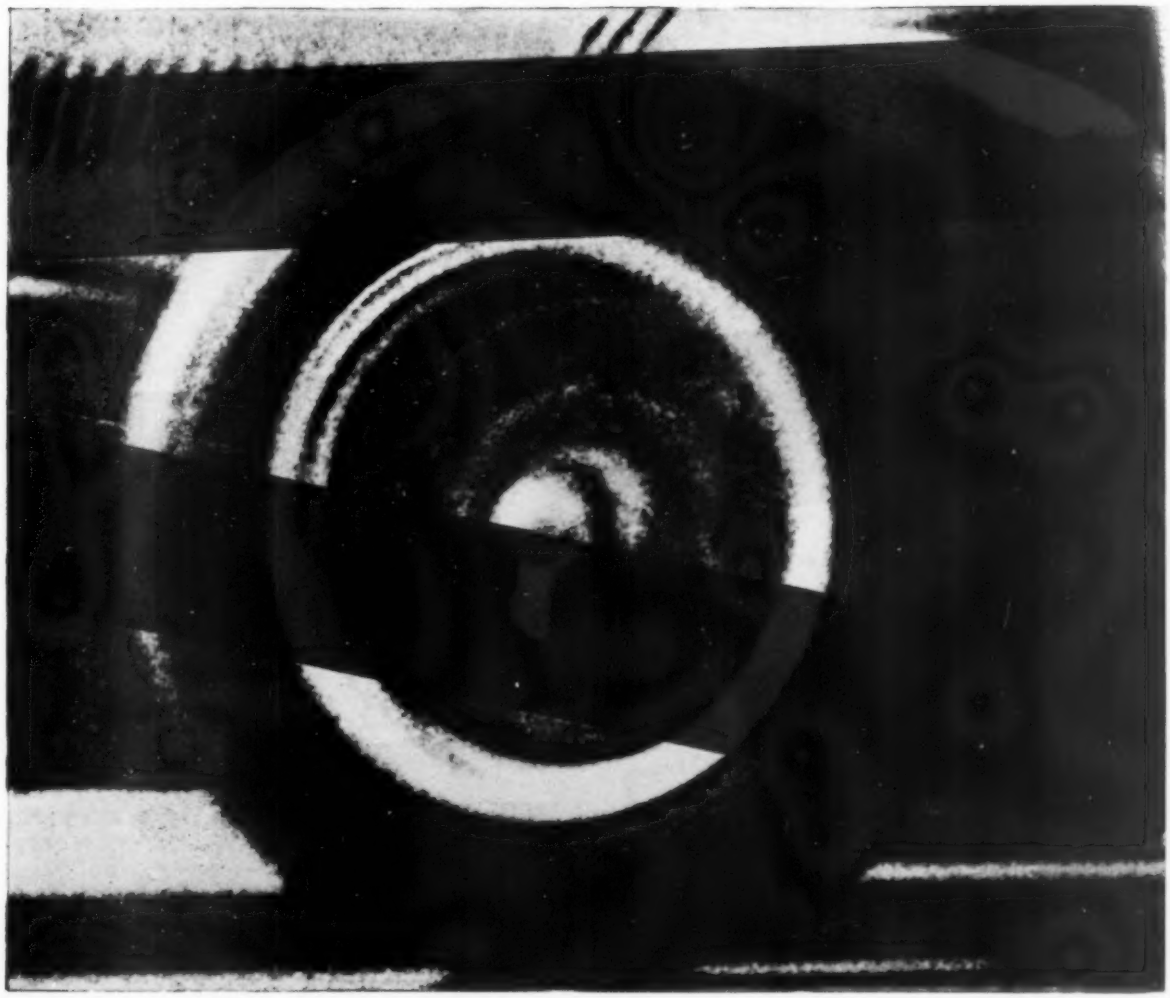
This is the first advance factory to be built by the Corporation, which plans further developments on similar lines to attract new industry to the area. Despite the substantial growth of petro-chemical activity in recent years, considerable expansion is still sought by the local authority.

Colour Dispersions for Plastics

A new company, Noss Mayo Dispersion Products Ltd., is specializing in the production of dispersed materials. Initially production has been started on the manufacture of colour dispersions for use in industries, including the plastics industry.

Special dispersion machinery has been developed by Noss Mayo and in the field of colours the products include colours dispersed in plasticizers for use in the plastics industry — usually in DIOP or TXP — and colours dispersed in polyester resin for use in reinforced plastics.

Most colours are tailor-made for customers by the company, which is based at Hersham Trading Estate, Walton-on-Thames, Surrey.



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PLASTICIZERS FOR PVC — PART 2

Classification of Plasticizers

MISCIBILITY AS A MEASURE OF EFFECTIVITY

By W. S. PENN, BSc

This is the second article of a series on pvc plasticizers. The concept of efficiency is considered by a study of miscibility and effectivity and a detailed classification of plasticizers is given. This system will be used throughout the series and should be useful in assisting the choice of plasticizer for any particular application

IN the present article it is proposed to consider two important general aspects of plasticizers. These are the conception of efficiency and a detailed classification.

In the case of efficiency, it is proposed to study miscibility by the method of Doty and efficiency or effectivity as described by a number of investigators. Both methods have as the object the placing of the plasticizers in order of efficiency so that help is given in forecasting properties and the quantity of a given plasticizer to be used.

As far as classification is concerned, the reasons for the choice of the system will be given and detailed lists of plasticizers in each group will be provided. The system will be used throughout the series of articles and should be useful in assisting a choice of plasticizer.

Plasticizer Efficiency

It is obviously of the greatest importance to the plastics industry to know which are 'good' plasticizers. This term in interpreted with a certain amount of confusion but is generally held to be concerned with the ease with which the plasticizer fluxes with the resin, its miscibility anl effectivity. It is proposed to discuss these aspects in some detail.

Many attempts have been made to correlate the physical constants of plasticizers with their plasticizing characteristics.[1] The most obvious, of course, is boiling point and at 760mm.Hg. the boiling point should preferably not be lower than 400°C. The viscosity of plasticizers has also been used as a criterion with some success, although there are quite a number of exceptions to general rules.

At the present time a study of efficiency has resolved itself into a study of miscibility and efficiency factor. Both are necessary, since, although miscibility makes a preliminary choice of plasticizer, quite different results can be obtained within the limits of miscibility by efficiency tests. This is a very important point to keep in mind and is often forgotten.

Once efficiency factors have been determined it is very useful and interesting to compare plasticizers at their efficiency levels as well as quantity levels. Quite important savings in plasticizers can be made by these means.

The Miscibility Approach

One approach to the effectivity of a plasticizer is its miscibilty with resins. The standard way of doing this is to prepare pvc compounds containing increasing quantity of plasticizer and seeing when 'sweating' occurs. This, of course, is a very prolonged and expensive method.

The most convenient way of determining miscibility is the technique used by Doty.[2] He employed the μ value concept which is the numerical index of the degree of mixing of plasticizer and polymer. It is derived by determining the equilibrium swelling of cross-linked pvc films in plasticizer, the μ being the constant in the equation used.

The value of μ varies from -1.0 to $+2.0$ and a value of 0.55 is significant. Those plasticizers having μ values below this point are highly miscible and those above are non- or partially miscible. Fig. 1 illustrates the point for a number of phthalate plasticizers. Jones[3] *et al.* drew some interesting conclusions from work of this type.

1. In any ester series maximum miscibility is given by the amyl group.

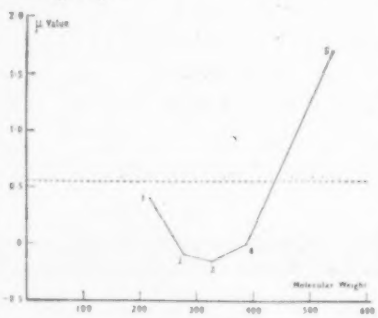

Fig. 1

2. Alkyl groups below C_4 and above C_8 reduce the miscibility unless combined with a more active acid radical such as a phosphate. With this, reasonable miscibility can be expected even with groups up to C_{14}.
3. The degree of miscibility for one specific alkyl group is as follows: The highest are phosphates, phthalates, adipates and sebacates and the lowest stearates and palmitates.
4. With C_{10}–C_{14} or higher alkyl groups and sebacic or phthalic acid, low volatility will be obtained but limited miscibility will result.

Obviously work such as the above is capable of extension if not of refinement.

The Effectivity Approach

The degree of miscibility of a plasticizer can only give limited information. For example, suppose plasticizer A is only miscible to the extent of 100phr and plasticizer B is miscible to the extent of 150phr, it might be (and has been) assumed that B is 'better' than A. Since, however, both will more often than not be used at, say, 60phr, it may be that only 55phr of A is required to give the same flexibility, etc., as 60phr of B. Plasticizer A is then said to be more effective than plasticizer B and is, in fact, a 'better' plasticizer.

Several investigators have used the efficiency approach and each has aimed at determining the quantity of plasticizer required to give the same value of a certain property. Reed,[4,5,6] used elongation, Lawrence and MacIntyre[7] based their figures on torsional modulus measurements, and Rider, Sumner and Myers[8] on resilience. These results are summarized in Table 1.

The principle of the efficiency (or effectivity as it is often called) approach is that the lower the quantity of plasticizer required to confer a given degree of flexibility, the more efficient the plasticizer. An efficiency factor can also be calculated whereby the value for DOP (as an average plasticizer in so many properties) is divided into the values for the other plasticizers. Thus in Table 1 the efficiency factors of DBS and Paraplex G25 are Solidus 26.5/33.5 =

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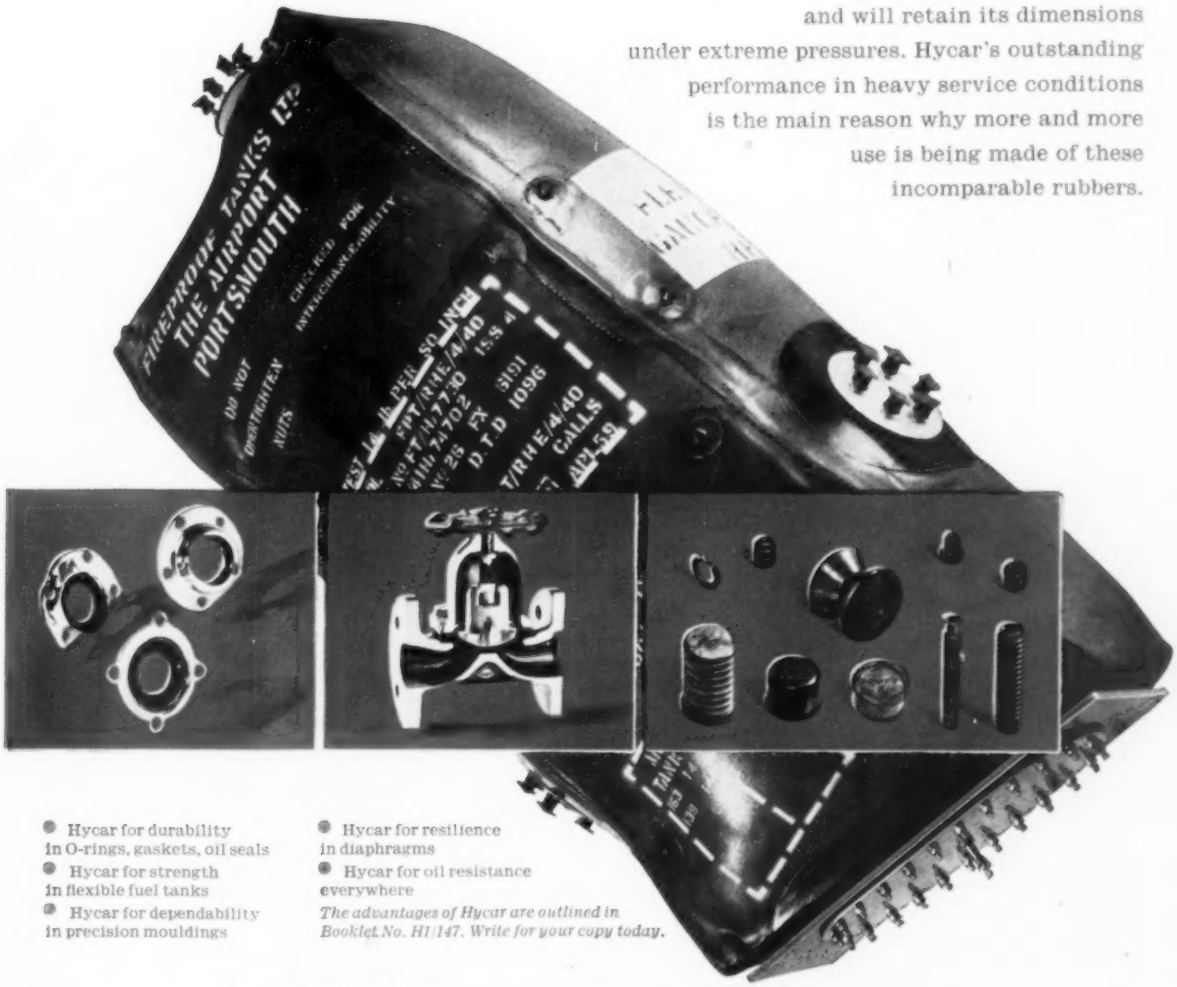

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0.79 and Solidus 39.8/33.5 = 1.19 respectively. Values less than 1.0 obviously mean a very effective plasticizer and those above a less effective plasticizer. The efficiency factors are specific to individual investigators (Reed's values were used above) because each one will obtain different results, but the general order in which plasticizers are placed will be similar.

TABLE 1
COMPARATIVE EFFECTIVITY FIGURES FOR PLASTICIZERS

Plasticizer	*Viscosity, Cps at 20° C.*	*Plasticizer Content, %*		
		Reed	*Lawrence and Macintyre*	*Rider, Sumner and Myers*
Di-butyl sebacate	10	26.5	27.0	28
Di-butyl phthalate	15.7	28.5	29.1	—
Tributyl glycol phosphate	20.1	29.5	30.6	—
Plasticizer SC	16.5	29.3	—	—
Di-octyl sebacate	20.8	32.5	35.1	37
Di-octyl phthalate	81.1	33.5	33.3	39
Butyl acetyl ricinoleate	35.3	34.6	—	—
Tri-tolyl phosphate	120.0	35.3	36.3	45
Paraplex G25	3×10^5	39.8	—	48

Referring to Table 1, the interesting point is noticeable that there is reasonable agreement between the order of plasticizers given by viscosity and physical property tests. The exceptions, plasticizer SC and butyl acetyl ricinoleate 'sweated out' which means that their miscibility was not so high as that of the other plasticizers. This illustrates the point that any plasticizer comparisons should be made within the limits of miscibility.

It seems that a variety of properties can be used to check effectivity. Jones[3] *et al.*, have determined the effectivity quantity from room temperature flexibility, 100% modulus, hardness and tensile creep figures. The results they obtained are averaged in Table 2.

TABLE 2
EFFECTIVITY QUANTITIES FOR COMMON PLASTICIZERS

Plasticizer	*Average Effective Quantity*
Tri-tolyl phosphate 40/42 ORD (ORD = Ordinary)	35.0
Tri-tolyl phosphate 40/42 LOC (LOC = low ortho content)	35.8
Tri-tolyl phosphate 52/53 LOC	35.3
Tri-tolyl phosphate HOC (HOC = high ortho content)	36.3
Tri-tolyl phosphate (tri ortho)	37.2
Tri-tolyl phosphate (tri meta)	34.4
Tri-tolyl phosphate (tri para)	38.1
Tri-xylenyl phosphate	36.6
Di-butyl phthalate	27.7
Di-iso-butyl phthalate	29.7
Di-heptyl phthalate	34.9
Di-octyl phthalate	34.0
Di-iso-octyl phthalate	35.3
Di-capryl phthalate	35.3
Di-nonyl phthalate	37.5
Di-butyl sebacate	27.5
Di-iso-butyl sebacate	28.9
Di-octyl sebacate	33.7
Di-cyclohexyl sebacate	33.2
Paraplex G25	39.2

The results in Table 2 are fairly obvious and follow the expected trend. One or two outstanding points may be noted, however. First, the polymeric plasticizers (Paraplex) are the least effective types (a number of Paraplax types and other polymeric types have now been made very effective) which is to be expected on all grounds considered above. Second, the lower aryl phthalates (dibutyl phthalate for example) are considerably superior to the alkyl phosphates (and tri-tolyl phosphate) but the higher aryl phthalates (di-nonyl phthalate for example) are no better than the alkyl phosphates. The same sort of difference applies to the lower and higher aryl sebacates.

Classification

With the large number of plasticizers it is obvious that some system of classification must be made. Unfortunately there are several ways in which this may be done and there is overlapping between the systems.

First they may be classified according to their chemical constitution, *i.e.*, phthalates, phosphates, sebacates, etc.; *second* they may be classified according to their miscibility, *i.e.*, primary and secondary plasticizers; *third* they may be classified according to their end usage, *i.e.*, general purpose, fire resistant, low temperature, for food products, etc.; *fourth* according to whether they are polymeric or monomeric; *fifth* according to their effectivity; and *sixth* combinations of these may be used.

All of these methods have been used and any scheme can, at the best, be a compromise. All methods too, have defects, so that it is necessary to choose one and retain it. The groups used in the present series of articles are as follows: Group 1 — The phthalate plasticizers; Group 2 — The phosphate plasticizers; Group 3 — Low temperature plasticizers; Group 4 — Polymeric plasticizers; Group 5 — Miscellaneous plasticizers. Details of these groups are given below.

Groups 1, 2 and 3

Group 1. All of the plasticizers in this group are monomeric, a number are general purpose and they are all virtually primary plasticizers. They are the most popular and a list of the more common is given below.

(a) Di-alkyl phthalate 79 (DAP), (b) Di-butyl phthalate (DBP), (c) Di-capryl phthalate (DCP), (d) Di-octyl phthalate (DOP), (e) Di-iso-octyl phthalate (DIOP), (f) Di-nonyl phthalate (DNP), (g) Phthalate 79, (h) Di-iso-butyl phthalate, (i) Di-2-butoxyethyl phthalate, (j) Phthalate 9719/ME, (k) Di-iso-decyl phthalate (DIDP), (l) Phthalate 101.

Group 2. Tri-tolyl phosphate is general purpose, all are monomeric, all are fire resistant but there are both primary and secondary plasticizers.

The primary phosphates are (a) Tri-tolyl phosphate (TTP), (b) Tri-xylenyl phosphate (TXP).

The secondary phosphates are (c) Tri-alkyl phosphate 79 (TAP), (d) Tri-octyl phosphate (TOP).

Group 3. The most common of these are the sebacates, adipates and azelates. They are all monomeric and secondary plasticizers. The most common ones are as follows: (a) Di-butyl sebacate (DBS), (b) Di-alkyl sebacate 79 (DAS), (c) Di-iso-octyl sebacate (DIOS), (d) Di-octyl sebacate (DOS), (e) Sebacate 79, (f) Di-alkyl sebacate 79, (g) Di-butyl adipate DBA, (h) Di-alkyl adipate 79 (DAA), (i) Di-iso octyl adipate (DIOA), (j) Di-octyl adipate (DOA), (k) Di-decyl adipate (DDA), (l) Di-iso-octyl azelate (DIOZ), (m) Di-(n-octyl-n-decyl) adipate (DODA), (n) Di-octyl azelate (DOZ).

Polymeric Plasticizers

In discussing the polymeric plasticizers a little problem of nomenclature at once arises. This is because some of the materials normally grouped under the heading 'polymeric' are not polymers at all. However, most are and it is convenient to retain the expression. High molecular weight plasticizers would be a better generic name (in view of the main exceptions — the epoxy compounds) but it is not often used. In the present system the epoxy compounds are included in the miscellaneous group.

Hill[7] has made a useful classification of the polymeric plasticizers. Based on this work, the following are the sub-groups.

Group 4A. These are polycondensation products of a dicarboxylic acid and a dihydric alcohol (glycols). The former are represented by sebacic, adipic and azelaic acids and the latter by propylene glycol, butylene glycol, 2:2 dimethyl propane — 1:3-diol (neopentyl glycol).

Examples include polypropylene sebacate (PPS) and polypropylene adipate (PPA). It should be noted that the propylene radical is by far the most common.

Group 4B. This group is similar to Group 4A except that a third re-

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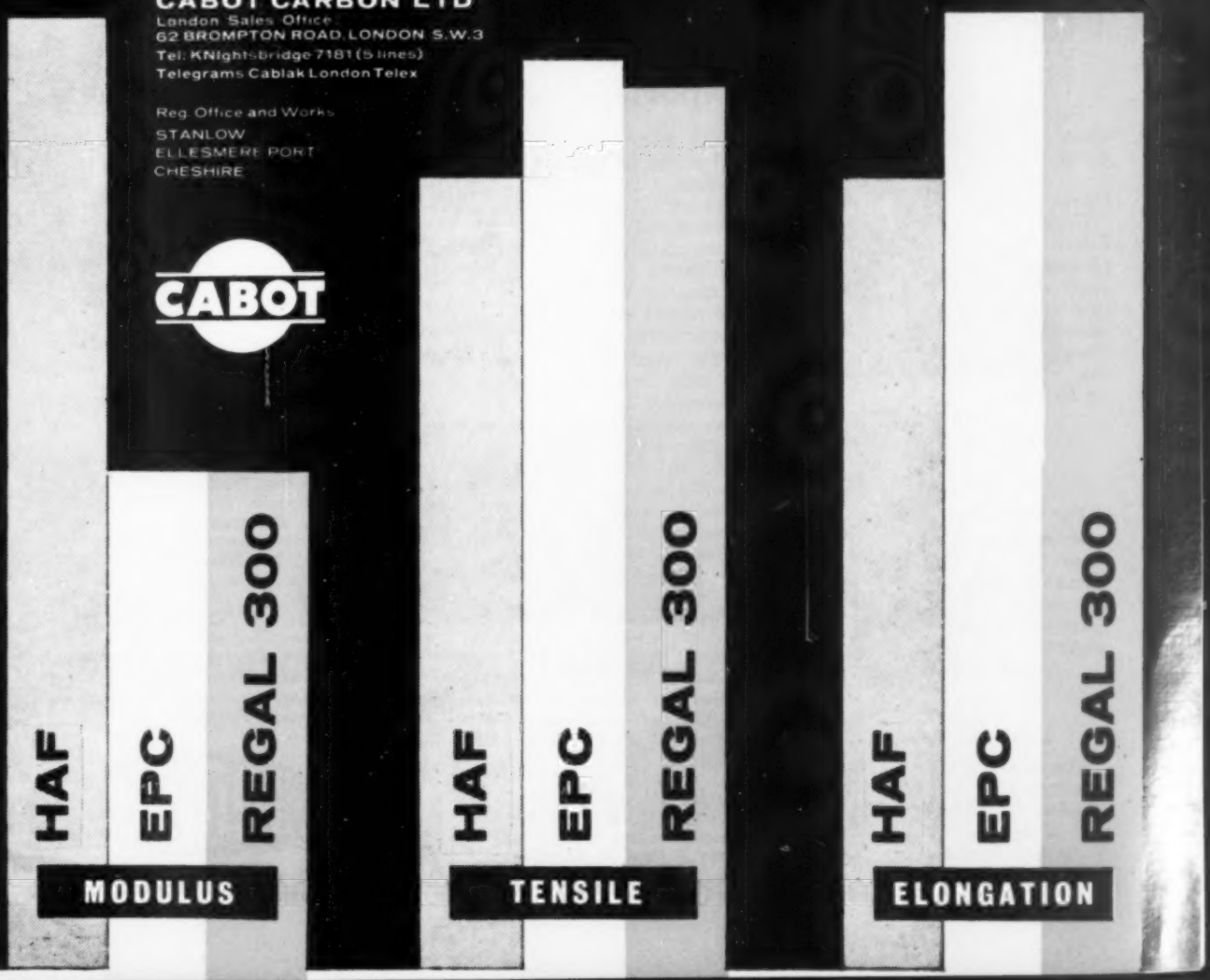

actant is introduced. This is a monocarboxylic acid (lauric acid for example) which prevents some chain growth by reacting with some of the glycol units. Thus molecular weight can be reduced. This gives PPA/MCA (*i.e.* PPA with a monocarboxylic acid) and PPS/MCA.

Group 4C. This group has its molecular weight reduced in a similar manner to Group 4B except that the third component is a monohydric alcohol such as 2-ethyl hexanol. The group thus consists of such products as PPA/MHA.

The miscibility of Groups 4B and 4C is much better than 4A but none can be called primary plasticizers. All the groups have low volatility which is one of the main reasons for using them. The effectivity is generally less than the monomeric plasticizers and some results are given in Table 3.

TABLE 3
EFFECTIVITY QUANTITIES OF POLYMERIC PLASTICIZERS

Plasticizer	*Effectivity Equivalent* (%)
PPS	41
PPS/MCA	40
PPA	43
PPA/MCA	40
PPA/MHA	42
Epox. oil	37
DOP	36
DOS	35
TTP	37

The exceptional effectivity of the epoxy plasticizers is well worth noting.

Group 5

Group 5A. Epoxidized Oils and Esters. These are the so-called epoxy plasticizers sold as commercial products and described in detail in a later article. They are based on unsaturated fatty glycerides such as soya bean oil, tea seed oil and certain fish oils, represented by R in the following formula:

$$\begin{array}{l} CH_2OOC{-}R \\ | \\ CH\ OOC{-}R \\ | \\ CH_2OOC{-}R \end{array}$$

The unsaturated hydrocarbon R contains about 17 carbon atoms and, on average, two unsaturated groups. These are 'epoxidized' with an oxidizing agent such as peracetic acid according to the following general reaction:

$$\begin{array}{l} {-}CH_2{-}HC{=}CH{-}CH_2{-} \\ \qquad\qquad \downarrow \\ \qquad\qquad O \\ {-}CH_2{-}HC{-}CH{-}CH_2{-} \end{array}$$

The epoxy plasticizers have comparatively high molecular weight (and therefore low volatility) but have the ease of incorporation and effectivity of the best monomeric plasticizers.

Group 5B — Plasticizer Extenders. These normally have quite limited compatibility with pvc and cannot be used alone. With 'true' plasticizers they may be used in varying amounts to reduce costs. The most important groups include chlorinated waxes chlorinated diphenyls, oil extracts and oil residues.

Other Sub-Groups

There are a number of other groups possible, although many of the plasticizers are little known at the present time. For example, the monoesters of phenols with fatty acids or benzoic acid and alcohols with benzoic acid or phenyl acetic acid. Phenoxy ethyl oleate is claimed to be a good low temperature secondary plasticizer.

The glycol esters have good low temperature properties at fairly low cost. Di- or tri-ethylene glycol or di-propylene glycol is reacted with benzoic acid, levulinic acid, etc. An example is diethylene glycol dibenzoate. There are also esters of hydroxystearic acid and ricinoleates such as acetylated glyceryl monoricinoleate.

Summary

Although the plasticizers given in the present article are but a small part of a growing list, they are the most important ones. For ordinary compounding purposes, no others need be considered except when costs must be reduced or marginal changes of properties are required.

In general, only a few of the plasticizers are really important so that for many compounds the choice is comparatively simple. A detailed scheme for the choice of plasticizers is given in a later article.

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[5] M. C. Reed and L. Connor, *Ibid.*, 1948, **40**, 1414-1422.
[6] M. C. Reed and J. Harding, *Ibid.*, 1949, **41**, 675-684.
[7] R. R. Lawrence and E. B. MacIntyre, *Ibid.*, 1949, **41**, 689-694.
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[9] A. Hill, *British Plastics*, 1959, **32**, 74.

The third article in this series will be published in *RPW*, September 23 issue. This will describe in detail some common monomeric plasticizers.

Important Polymer Conferences Schedule

THE programme liaison committee of the Institution of the Rubber Industry, the Oil and Colour Chemists' Association, the Plastics Institute and the Plastics and Polymer Group, Society of Chemical Industry, has issued a schedule of important meetings or conferences on polymers and related subjects, planned by the four societies and others.

The committee, which was formed in 1960, acts 'as a committee of information for conferences on polymers and related subjects, with particular reference to those held in the UK, and co-ordinates the timing, location and subject matter of these when organized by the bodies represented on the committee'.

The schedule is:

1961

Sept. 20 to 22. Symposium at Bristol on 'Science and Craft in both Textile and Non-textile Coloration'. *Society of Dyers and Colourists.*

Sept. 28 to Oct. 8. International Congress of Industrial Chemistry in Bordeaux. *Société de Chimie Industrielle.*

Oct. 31 and Nov. 1. Conference on 'Engineering with Plastics'. *PI.*

Nov. 1. Joint conference with Manchester Section of SCI on 'Polyurathene Foams' at Manchester University. *P and P Groups.*

Nov. 29 to Dec. 1. Meeting at Brighton of Reinforced Plastics Discussion Group. *British Plastics Federation.*

1962

Jan. 30 to Feb. 2. Annual technical conference in Pittsburgh. *Society of Plastics Engineers, USA.*

Feb. 26 to Mar. 1. Fourteenth technical exhibition. *OCCA.*

Mar. 13 to 15. Conference on Testing for Performance. *PI.*

April. Annual lecture. *P.I.*

May. Centenary of Plastics 1862-1962. *PI and British Plastics Federation.*

May 15 to 18. Conference at Torquay. *British Plastics Federation.*

May 21 to 26. Fourth Rubber Technology Conference. *IRI.*

Sept. (a two-day meeting to be held during the last two weeks.) Polymer Techniques. *P and P group, SCI.*

Nov. 16 and 17. Conference in Leamington on 'The Background to Management Decision — Britain in the early 1960s'. *IRI.*

Nov. 29 to Dec. 1. International Conference on Reinforced Plastics. *British Plastics Federation.*

1963

March. Fifteenth Technical Exhibition. *OCCA.*

March. Conference on Polymers. *Plastics Institute, IRI, P and P group, SCI.*

June 25 to 29. Biennial Conference at Scarborough. *OCCA.*

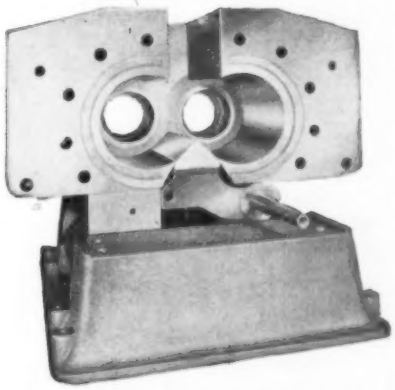
NEW BANBURY* DROP DOOR DELIVERS 3 BIG BENEFITS

- *leakage prevention*
- *shorter cycles*
- *almost instantaneous discharge*

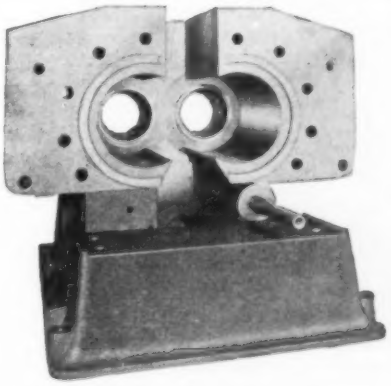
Here's a new development in Banbury mixer design: the hydraulically operated drop-door . . . now available as an optional feature on all new production-size machines. The drop-door design does away with a source of leakage and contamination which cannot be avoided in sliding-door design. Clearances which permit some leakage are required for sliding action which is not the case with the drop-door. The new door is hinged, and the surfaces of the door edge and the bottom of the mixing chamber are tapered so that a good line of contact is obtained. The door is leakproof throughout a full period of normal wear and there are no tailings left to contaminate a succeeding batch. The new door has been clocked as low as eight seconds for opening, discharge and closing—more than twice as fast as a sliding door. As a result, the overall mixing cycle is reduced. And, in short-cycle operation, discharge time is in better balance with actual mixing time.

Faster discharge, besides cutting cycle time, is particularly advantageous when formulas require almost instantaneous discharge after pre-determined temperature is reached. With some, a few seconds lag will permit the stock to set up in the mixing chamber.

* *Banbury is a registered trade mark in many countries throughout the world*

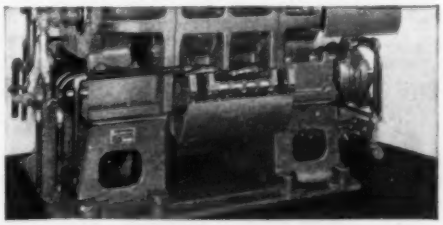


Chamber of Banbury with drop door in closed position



Drop door partially open

Angular view of drop door in open position



Size 11 D-High Pressure high horsepower uni-drive Banbury Mixer with drop type discharge door.

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AMERICAN LETTER — from Norman L. Hewitt

General Tire Legal Battle Continues

NEW PROCESSES FOR THE PRODUCTION OF FOAMBACKS

ONCE General Tire's patent on the use of oil-extended SBR for tyres was won in a suit against the Commissioner of Patents, General Tire lost no time in bringing suits against Goodyear and US Rubber for infringement. (These defendants were picked for purely arbitrary reasons, since nearly every tyre company in the country now uses oil-extended elastomer.) Shortly thereafter, Firestone brought a countersuit in the Baltimore District Court — which significantly lies outside the Cleveland area of highly concentrated rubber-legal activity — to have the patent declared invalid. The Firestone position is based on their purchase of one of the government-owned synthetic rubber plants where oil-extended rubber was made, a purchase whose contract included rights to all research carried out under the period of government ownership. Firestone — and all other potential infringers — contend that when it bought the factory it also bought the right to make oil-extended rubber.

The royalty asked by General Tire, based on the weight of oil-extended rubber, amounts to 3 cents per tire. This translates to a value of 50 to 70m. dollars over the 17-year life of the patent.

Meanwhile, General has received a Swedish patent on the oil-extended process as ammunition in the trial. They point out that this patent could have been contested, but was not. Whether this Swedish approval will be admitted as evidence in US courts, however, is another matter. It will be necessary for the courts to decide whether this is pertinent to the cases involved — and this is difficult under strict US rules of evidence.

The oil-extended principle is applicable to other than butadiene-styrene copolymers, and it is possible that the litigation may extend into other new products. At present, the only other oil-extended polymer is Shell's Polyisoprene I-500 (which sells for 21½ cents per lb.), although oil-extended polybutadiene is also under development.

Despite the uneven course of government-industry relations in the field of research, the larger rubber companies continue to enjoy substantial amounts of defence-contract business. Five rubber companies were listed among the nation's top 100 defence contractors in fiscal 1961. The total amount allotted to these 100 firms was $15½ billion. The rubber industry's share and company rankings follow: General Tire, 17th — $243m.; Goodyear, 39th — $85m.; Goodrich, 77th — $34m.; Firestone, 92nd — $26m.; US Rubber, 99th — $24m.

Foamback Processes

Latest news items in the foamback field are concerned with proposed new methods of manufacture.

Two new urethane foam processes appear to be eminently suited to the production of foambacks.

The Technifoam Corporation (New York) will manufacture, lease, and licence their machines, although the basic patent (US 2,841,205) and the right to use the process with cloth belongs to Collins and Aikman. Six additional US and foreign patent applications covering equipment, design, and process techniques have been filed by Technifoam.

Briefly, the process consists of a continuous feeding of isocyanate, polyether, and catalyst, spreading between two sheets of fabric, paper, foil, or wood; forming between two rolls to a thickness of $\frac{1}{16}$in. to 3in.; and expanding under infrared lamps. A plant will be constructed in Carteret, New Jersey, to develop new end-use products. The main difference between this new process and the conventional slabbing machine lies in the thickness of slab produced. The much thinner Technifoam sheet practically eliminates the need for cutting or trimming. Since the foam forms in contact with fabric, the bonding operation is also eliminated.

Falls Engineering and Machine Co. has developed a circumferential paring machine for fabricating logs of synthetic foam into semi-continuous sheets for foamback and other uses. A log of synthetic foam is placed on the machine's core bar and is then automatically rotated into the cutting head in such a way that a continuous sheet of foam is pared or peeled from the log. The pared stock is threaded between two compression rolls and then passes to a wind-up assembly which rolls the stock up on a 2 or 3in. paper core for use in laminating to cloth.

Foam can be pared into a sheet as thin as $\frac{1}{16}$in. and different thicknesses are obtained by changing lead screws in the cutting head assembly. This can be done in five minutes or less.

Ozone at Murray Hill

In their paper describing a new theory for the mechanism of ozone degradation (*RPW*, April 8 1961), R. W. Murray and R. R. Story of the Bell Telephone Laboratories (Murray Hill, New Jersey) rather effectively demolished the possibility that anti-ozonidants react directly with ozone to protect elastomers from cracking. Their proposed mechanism was, in fact, the converse of the ozone scavenger theory, in that it postulated the scavenging or removal of the double bonds, rather than the ozone. Since ozone attack occurs at the unsaturated positions, removal of the double bonds will prevent cracking just as effectively as removal of ozone. The kernel of the new theory is the formation of cross-links from double bonds to produce an unreactive surface. This cross-linking results from reaction of the peroxides initially formed by ozone with the amine anti-ozonidant to produce free radicals; these free radicals effect the formation of the cross-links. Thus is formed a molecular structure somewhat similar to that produced in vulcanization.

It is this similarity on which the authors are basing their experimental approach to proving the theory. If antiozonidants do produce cross-links in the presence of ozone, it should be possible to measure this through an increase in modulus or tensile properties. The procedural problems here are formidable. Not only is there some doubt about the minute

extent of this reaction being detectable, but there is also the question of conflicting the rheological changes in the test specimens. When I talked to Dr Murray recently, he described difficulties of the latter type in which plastics flow of the stretched specimens was obscuring cross-linking effects. (Perhap SP natural rubber would be of help here.) However, some tensile and viscosity increases had been found and additional tests were proceeding.

Imports and Exports

The Department of Commerce has supplied some highly revealing data on the past decade's foreign trade in elastomer raw materials and rubber products. The traditional position of the US was that of an importer of raw materials and an exporter of manufactured products. Today raw elastomer exports are almost 100% greater in value than are products exported; product imports have increased to a point where they almost equal those exported. In well-rounded figures, we have the following (value in dollars x 10^6):

	1949	1960
Imports		
Raw natural rubber	240	324
Products	2	136
Exports		
Raw elastomers	13	235
Products	105	150

The contrast is startling — but misleading. Were one to apply the thoroughly defensible adjective of 'manufactured' to the raw elastomer category, our product export figure would once more become substantial, and if one moves the $80m. worth of Japanese footwear concealed in the 1960 product import figure into a mental warehouse, the relationships become more meaningful.

Actually, the present over-supply of Japanese Zourri sandals in the US takes up something considerably more substantial than mental warehouses. It has been estimated that there are some 70m. pairs of these rubber beach shoes now in storage and that it will require 18 months to dispose of the surplus.

Plastics in the West

The Western Section of the Society of the Plastics Industry Inc., has selected as its 1961-62 chairman, J. Allen Carmien, president of New Plastic Corporation, Los Angeles, California. Representing 130 companies the SPI Western Section continues to expand its membership consistent with the growth of the plastics industry in this area. For years the West Coast has accounted for about 10% of the national consumption of plastics products; lately the figure has approached 13%. Contributing to this increase has been the westward shift of population, demonstrated by recent census and election figures. SPI estimates that about 800m. lb. of plastics materials were consumed on the West Coast in 1960 and that this figure will be increased this year to an all-time record for the West Coast plastics industry of approximately 900m. lb. of plastics products.

Scrambling the Air Waves

Small plastics manufacturers have never regarded their industry as being particularly in need of Federal regulation. But in a country where even the air waves are crowded, their use of electronic warming and heat sealing equipment has caught the attention of the Federal Communications Commission. The government body's concern arises from the harmful interference to radio navigation and safety radio services which is caused by several types of electronic apparatus. Under a new amendment to the FCC rules, any offending equipment can be ordered out of use immediately when such interference is present. Past occurrences have shown that plastics manufacturers of toys, novelties, clothing and housewares are often the unthinking scramblers of the airwaves. Now they will have to learn and conform to still another set of regulations. Fortunately, they have engineering advice readily available from the Radio Frequency Interference Committee of the Society of the Plastics Industry.

Firestone in Liberia

During the recent months of political and military pandemonium in Africa many of us have wondered what effect the chain reaction of independence would have on Firestone's Liberian rubber plantations. That company's own view of the situation was at least partially revealed during the recent hearings of the House Foreign Affairs Sub-committee on Africa. B. H. Larabee, president of Firestone Plantations of Liberia, testified before the committee that private industry in Africa needs government help to expand and to maintain present investments, and that the need is critical. He specifically recommended long-term, low interest loans, with outright grants of aid for education, health, and agriculture.

J. F. King, in *Rubber World*, reported Mr Larabee's further statements regarding Firestone's activities in Liberia:

Noting that the United States had never granted Liberia any economic aid — despite the 'special responsibility' of this country to aid the Republic which it helped set up in 1847 when former American slaves were repatriated and established in a colony on Africa's West Coast — Mr Larabee said that 'we ought to look after our friends at least as well as we look after our former enemies'.

Rep. Horace Seely-Brown (Rep., Conn.) called attention to the fact that the high level of investment in Liberia by Firestone and, more recently, by an iron-ore consortium of free-world steel companies might account for the ability of the US Government to 'get by' in Liberia without extending foreign aid. Mr Larabee's answer was that the time was long past when the US Government could afford to ignore Liberia's aid needs.

Discussing Firestone's operations in Liberia since the 1920s, Mr Larabee said that the firm had a planting agreement with the Liberian Government under which Firestone had the right to acquire a million acres of rubber-growing land under title to Liberia, which Firestone then leased back. Firestone had so acquired 200,0000 acres, of which 90,000 were in rubber cultivation now. Actually, he said, only 63,000 acres were now in active production, since the company's replanting programme had idled some 25,000 acres.

In addition, he continued, Firestone acted as agent for a number of commercial firms doing business in Liberia; had introduced the only cash crops (coffee, cocoa, and indigenous food crops) harvested in the country; and set up in business for themselves 2,000 local Liberian rubber farmers.

He said that Firestone had had its differences with the Tubman Government such as the government's criticism of Firestone for not using enough Liberian personnel in higher positions. But the government and the company generally got along, mainly, he indicated, because the government had sought to maintain democratic institutions in the country.

Tepco 8ft. and 10ft. rowing/outboard dinghies are made from Bakelite polyester resin reinforced with glass fibre. Light and strong, they are manufactured by the Essex Plastics Co. Ltd., Leigh-on-Sea

Laminates Prominent at IPE

OVERWHELMING IMPORTANCE OF POLYTHENE

THE International Packaging Exhibition was held at Olympia, London, from September 5-15 1961. The most noticeable feature, at least from the plastics point of view, was the importance of materials other than plastics! To people preoccupied with plastics this came as a surprise, particularly the glass bottles, tin cans and cardboard boxes. These strongholds will undoubtedly remain intact, though dented, for many years.

Even so the conventional materials are feeling the impact of plastics on an increasing scale. Tin/pvc laminates are becoming increasingly popular and pvc and polythene coated boards are used on a big scale. Telcon Plastics Ltd. claims that nearly 30% of all multiwall paper sacks are now provided with a polythene coated inner wall. Such a marriage of plastics and paper is likely to survive the foreseeable future and is much more likely than a replacement of paper by plastics.

The really outstanding feature of the application of plastics in packaging was the use of polythene. There is no doubt that this is the major packaging thermoplastic sold in vast quantities as film, bags, sacks, coated papers, bottles, drums and so on. Many polythene products are disguised under such names as 'X-othene' (hypothetical) but they are unmistakably polythene in one form or another. Among all the conventional polythene products one rather insignificant, yet interesting development caught the attention. This was the 'disposable polythene glove' manufactured by **Mark Anthony and Sons Ltd.**, trim sealed on the Speedy Auto-Bag Sealer **(Bellow Machine Co. Ltd.)**. The glove is lightweight, could clearly only be used a few times and is one of those fashionable expendable items.

The materials themselves were far from being the most important aspects of packaging. Machinery for producing various packages were much to the fore. These ranged from hand types for the smaller producer or even shopkeeper, through semi-automatic machines, to completely automatic machines for not only making the packs but also filling them with powders, liquids and solids. One outstanding absentee from the machinery field was blow-moulding equipment, rather surprising in view of the large number of blown containers on view. One would have thought that the machine makers would be anxious to contact potential pack makers, since there must be quite a number of them.

The evidence of blow-moulding at the exhibition was second-hand through blown bottles and containers of other sorts. The same applied to injection moulding illustrated by numerous containers in polystyrene. Vacuum forming was represented in a direct manner by machines for forming containers of various sorts from toughened polystyrene and cellulose acetate in particular. Thus, the use of the important plastics processing techniques was demonstrated in the packaging industry and extrusion, not so obvious, was really much in evidence through lay-flat tubing.

Machinery will be fully covered in a second report next week.

Diversity of Materials

When a new material is developed the producers often foretell, often rather optimistically, the extensive applications which it will have. It is interesting, therefore, in an exhibition of this kind to discover that some of the materials are really being adopted. Perhaps the best example of this at the exhibition was Ralsin, to which the stand of **Whiffen and Sons Ltd.** was devoted and which made an impressive display.

There were at least 20 different plastics in various applications on show at the exhibition. The thermoplastics were, of course, the most prominent but we should not forget the moulded caps and containers in phenolic and aminoplastics. There were also rubber products, notably expanded rubber, for protecting sensitive components from damage and Pliofilm for bags, a very well-known packaging film.

The polyolefines are, of course, the most extensively used plastics at the present time. Polythene itself is used extensively for bags, sacks, liners, overwrapping and bottles, but inroads into its established position are gradually being made by high density polythene and polypropylene. One of the principal advantages of the latter is the ability to be sterilized.

The vinyls as a group are also used extensively. Bags and liners in particular are common and plasticized and unplasticized materials are used. Polyvinyl acetate is widely employed for paper conversion and polyvinylidene chloride for drum liners. Cellulose itself, and its derivatives, are obviously of the greatest importance. Cellulose acetate is extensively used in semi-rigid window containers, in blister packs and laminated products. Cellulose propionate is sold as a moulding powder and as blown bottles.

There are many miscellaneous plastics some of which are now widely used. Perhaps the most common, and the one with the greatest potential, is toughened polystyrene. It is a valuable material for use in vacuum forming operations to make box liners and trays. Expanded polystyrene was also a marked feature of the exhibition and is becoming very popular as a packaging material. Melinex is being used, particularly in tapes and sachets; nylon (coated) is being used in sachets; alginates in 'sprayed on' packs; Ralsin for many rigid sterilizable packs and FEP fluorocarbon for containers to hold particularly reactive chemicals.

Laminates

Apart from the use of straight plastics films a growing movement is the use of laminates. The most common are probably those using polythene films on such bases as cellulose, paper, foil, board and textiles where the impermeable nature and heat-sealing characteristics are of such great importance. An extension of this idea is three part laminates of foil, paper and polythene and the use of HD polythene on foil.

How far the use of pvc laminates has extended it is difficult to say. Certainly pvc/metal types are becoming very popular and the tough coatings provide an effective seal. Paper/pvc is also growing in use in liners of all types.

Among a number of miscellaneous laminates are metallized polyesters (particularly aluminium / Melinex) and 'copolymer' coated nylon. Both these materials are being used extensively as sachets where the nylon or foil provides the strength and the second component the heat sealing

Electrical Aids in Industry—Data Sheet **19**

Factory Heating—2

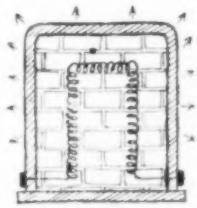
It is impossible in this Data Sheet to describe in detail every type of electric heater on the market, but a representative selection is dealt with below. Each type of building presents its own problem, and the best plan is to seek advice from your Electricity Board, who will be pleased to help.

'OFF PEAK' ELECTRIC HEATING

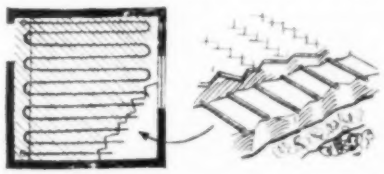
Because the 'off peak' load makes use of generating and distributing equipment when it would otherwise be idle or underloaded, it is attractive to the Electricity Boards, who offer cheap 'off peak' tariffs. Three types of 'off peak' heating systems are available, namely:

(a) Hot water storage heating: This consists of a conventional hot water radiator or panel heating system through which hot water from a large storage vessel is circulated. The water in the storage vessel is heated electrically during the 'off peak', low tariff hours and is circulated when required through the radiators or panels.

(b) Block storage heaters: These heaters consist essentially of a number of firebrick blocks which are heated up during the 'off peak' hours by means of suitable electric heating elements. The storage heaters are clad with a layer of suitable heat-insulating material and are housed in a sheet metal casing, the design being such that the stored heat is gradually dissipated throughout the day by means of radiation and convection from the casing. The great advantage of this method is that these heaters can easily be installed in existing buildings.



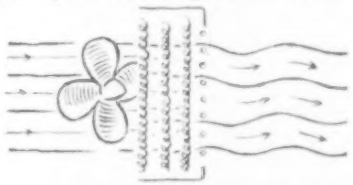
(c) Floor warming: In an 'off peak' floor warming installation, electric heating cables or ducts housing withdrawable cables are embedded in the concrete floor of the building. The cables are switched on and the floor is heated up during the 'off peak' hours, and the mass of concrete and screed of the finished floor has sufficient thermal storage capacity to heat the building during the period when current is not available. This method is only applicable to new buildings or buildings where new floors are being constructed.



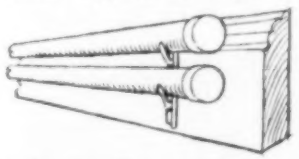
Plan view of room — Isometric view of heating cable

DIRECT ELECTRIC HEATING

(a) Unit heaters: These consist of a bank of electric heating elements fixed in a casing on which is mounted a fan which draws or blows air over the heating elements and discharges it, usually through adjustable louvres, in the required direction. A number of such units are mounted on the walls or stanchions or hung from the roof members in appropriate positions throughout the works.



(b) Infra-red heaters: These consist of heating elements usually of the sheathed metal or silica tube type mounted in a polished reflector. They operate at temperatures from 700 to 900°C, and give off the greater part of their heat output by radiation. They are mounted overhead in a similar way to unit heaters and are particularly useful for providing local areas of comfort in spaces not otherwise heated.

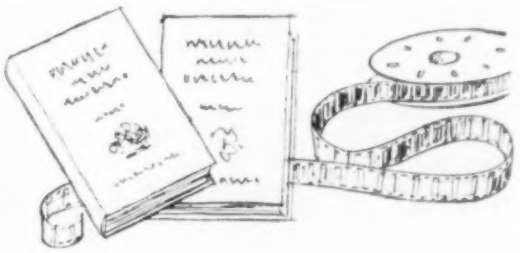


(c) Tubular heaters: These, as the name suggests, take the form of tubes approximately 2" in diameter containing an electric heating element and are available in lengths from 2 to 17 ft. The normal loading is 60 watts per foot run and the surface temperature is from 180 to 200°F. They are usually placed round the walls at skirting level, but also can be used at high level in order to prevent downdraughts from windows and skylights.

For further information get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on the industrial and commercial uses of electricity and reprints of articles and papers are available.

E.D.A. have available on free loan in the U.K. a series of films on the industrial uses of electricity. Film and Book Catalogues and Publications List sent on request.



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characteristics. The extension of this idea will undoubtedly grow rapidly.

The Many Faces of Polythene

It may seem sufficient to say that polythene is used for packaging and leave it at that. We all know that polythene is used for making bags and squeeze bottles so there is little more to be said. This attitude, however, would be under-estimating the ingenuity of the industry and polythene is now used in a wide variety of applications. The exhibition gave a few hints of the diverse nature of the material.

A typical example of a new 'face' was chill roll cast polythene made by extruding molten plastics film over water cooled rolls. The film is thus chilled rapidly, giving the product a high clarity, certainly superior to films produced by the usual blowing methods. The film is also claimed to take printing more easily.

Cast film is not new but the exhibition demonstrated how it is developing commercially. **Peter Dixon and Son Ltd.**, the papermaking firm, are pioneering chill roll cast film and, although they only started production a few months ago, are now manufacturing an extra high clarity product known as Dixopak. It can be sold in rolls from ¼in. to 36 in. wide, in a variety of thicknesses and was demonstrated as bags containing clothing, potatoes, flowers, textiles, stockings, etc., and its overwrapping qualities were demonstrated on loaves of bread and cigarette packets.

A different type of example concerns blown bottles and stoppers. We are all used to blown bottles with

This diagonally fluted polythene bottle is fitted with the first blow-moulded stopper to be produced by the Metal Box Co.

smooth surfaces but the process is much more versatile than that. The **Metal Box Co. Ltd.** had on display a diagonally fluted Poly-Tainer polythene bottle for bath crystals, effectively demonstrating the versatility of the blow-moulding process. As if to stress this, moreover, the bottle was fitted with what is claimed to be the first blow-moulded stopper. This remarkable object continues the fluting up to its point and is moulded to a fine tolerance to fit the neck of the bottle. A groove round its base snaps into a raised ring in the neck giving an airtight fit.

Thin-gauge polythene film is used to cover this chair by Swains Papercraft Ltd., keeping it clean at little cost

A wide range of bag forms is now made and well illustrated by the products of **Flexothene Ltd.** Their range of polythene bags includes side weld bags with printing front and back, pouches (single and double), book covers, bags with flaps, drawstring bags and so on. A polythene shopping accessory attracted much attention. Called the 'Closure 8 Eight' it is made by **R. K. Plastics Ltd.** and is a special type of clip to seal the bag at a point. Apart from use in shopping bags its major field will be in polythene display packs which can simply be unclipped instead of torn open if a customer wishes to see the contents.

The rapidly growing field of large blown bottles was well in evidence. When such products are used for alcoholic drinks then the barriers are really broken. **Venesta Plywood Ltd.** is producing a 10½ gallon high-density polythene bottle for **H. P. Bulmer and Co. Ltd.** the Hereford cider makers. It is 40% less in cost than a cask, can be sterilized, and is used inside a close-fitting plywood case. **The Ward Adams Co. Ltd.** among many other producers, had on show large polythene blown liners inside their Waco drums.

Plastics Shipping Bags

It is necessary to use the heading Plastics instead of polythene or pvc to describe the large shipping bags, since the two materials are contending for the crown of a big market. In the one corner, representing the UK and polythene was **Bakelite Ltd.** and in the other corner, representing Italy and pvc was **Industrie Chimiche Porto Marghere (ICPM).** All we can do is to examine each contender since it would be a brave man who attempted to judge in favour of one or the other of these two materials. Undoubtedly, each will find its proper level.

As far as polythene is concerned it has, of course, been used, as 200-400 gauge material, as liners for paper sacks for many years. Now 600-1,000 gauge material is being used to make shipping bags entirely of polythene, and with sugar alone using 23m. sacks a year, the potential is enormous. The big competitor at the moment is the paper sack with a lining of 1 mil or less polythene but what advantage it has in cost is perhaps outweighed by the reduced moisture barrier and danger of lint contamination from stitching material.

Bakelite Ltd. are using polythene shipping bags to ship polythene! They are waterproof, stronger than conventional materials (shown by bag drop tests), cleaner and the contents can be seen. The bags must be vacuum sealed to prevent slippage, and then they may be readily palletized. Quite high stacks can be built up.

IPCM has developed a special pvc formulation for extruding and blowing its Plypak packing material. It is sold in thicknesses from 0.07mm. to 1.0mm. and widths from 50mm. to 1,100mm. It can, of course, be handled in the usual way (cutting and welding and printing) and the sacks produced have a truly phenomenal strength. Apart from palletization, they have been stacked very high indeed (like polythene they readily conform to the necessary shape variations when stacking) and have been used for such diverse products as fungicides, cement, glues, fertilisers, calcium sulphate, soda flakes, tannins and the like. Huge stacks can be made out of doors without any form of deterioration of the packs or materials over long periods.

Visqueen Plunge-Pack

It is still necessary to stay on the subject of polythene since the plunge-pack system demonstrated by **British Visqueen Ltd.** has remarkable possibilities, both for the small and the large manufacturer. This is a patented process but a free licence is given to use it provided the specially developed Visqueen film is used.

The process is simple and consists of stretching the film over a plate,

heating it until it is in a suitable state of melt, when the object is plunged into it. The article, which can be quite irregular in shape, chills the film as it passes through it and after this, the still molten top of the 'skin' is twisted round to provide a seal. The thickness of the skin naturally varies and is thickest where the object initially touches the product. Starting with a 0.0005in. thick film, the thickest point after plunging is unlikely to be greater than 0.0025in. and may be as low as 0.0002in. but it never seems to break.

Three machines were demonstrated on the stand. The first was the original hand machine which is popular and relatively inexpensive. A semi-automatic machine and a virtually automatic machine were also demonstrated, the latter covering golf balls. The sole selling agents for the machines are **M. L. Shelley and Partners Ltd.**

The Hellipack

The use of edible skins is not new but **Foodteck Ltd.** added interest to their stand by the use of a new machine for applying it. Hellipack is an edible substance which is, in effect, applied to the article to be wrapped by means of a solution into which the article is dipped. The composition of the material is not disclosed, but it is probably an alginate.

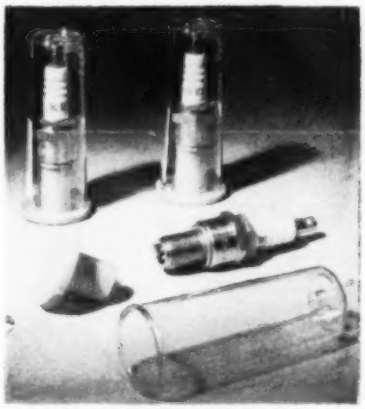
The new machine for the process, known as the Autocase consists of four main parts. The first is the automatic filler which portions the food and ejects it (sausages in particular); the second is the spray, actually a pouring solution, through which the object passes, then on to a conveyor on which it is drained; the third is the second dip, and the fourth the dryer. The dipping process takes about 5sec., the first draining about 20sec., and the second dipping about 25sec., followed by a very short drying. The process thus only takes about 10sec. in all allowing the development of continuous production.

The solutions are offered in concentrated form ready for dilution. The film gives improved appearance to foods, holds in the smell (particularly with fish) allows the food to be kept longer without refrigeration and keeps it clean. Films needs not be removed for cooking since they are edible.

Pvc Poultry Film

Viskase Ltd. is well known in the meat packaging field and were one of the pioneers of heat-shrink materials. They showed a new poultry film called Visten based on a modified plasticized pvc which is available in various bag forms to fit poultry of different contours.

The entire process is as follows. The birds are eviscerated, without giblets, and graded. A suitable seasoning and colouring matter is then applied to the bird and the bag stuffing process takes place. The bag is machine stretched, the bird inserted, surplus air is evacuated and the bag is sealed with a metal clip. There are two machines both operated by compressed air, the first being the



These KLG sparking plugs are packed in polystyrene containers moulded by Pioneer Plastic Containers Ltd. A small moulded-in sleeve and a clip-on polythene cap hold the plug securely

Visten Pneumatic Stuffer for birds up to 24in. circumference, the second the Visten Turkey Stuffer for the largest turkeys over 30lb.

The contained birds are next cooked in a special Rapidaire circulating air cooking cabinet and then cooled quickly and chilled overnight. The packs are suitable for deep-freeze cabinets and the pvc maintains its flexibility down to −50°F.

Tailored Packaging

The art of packaging has now become a science. It is no longer sufficient just to make a polythene, pvc or cellulose bag and seal the product inside: each product now requires individual treatment. This was well demonstrated by **British Sidac Ltd.** who manufacture a wide range of speciality cellulose, 'acetate' and polythene films.

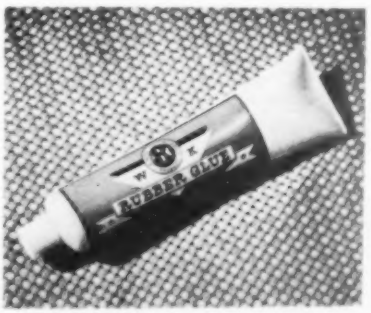
The most fascinating aspect of their products is a publication which lists a wide variety of fruits and vegetables and recommends the correct film for each one. The main variables, of which there are a number of possible combinations, include those which can and which cannot 'breathe', degree of impermeability (particularly to moisture), moisture resistance, clarity and whether or not they can be heat sealed. Internal condensation, associated with these factors, is another consideration to take into account when marketing for sales appeal.

PT grade allows the passage of moisture vapour, is non-moisture proof and cannot be sealed by heat. QSAT is commonly known as 'breathing' film and can be sealed by heat; acetate is waterproof by allows the passage of vapour; polythene (supplied perforated if required) is moisture and water-proof and can be sealed by heat and MSAT has high resistance to moisture vapour and can be sealed by heat. Thus, the different products are available for materials such as the following, each of which needs a different film: gooseberries, cherries, pears, celery, watercress, parsley, parsnips and other vegetables.

Plastics Tapes

Quite a few tapes for sealing or decorative purposes were on show at the exhibition. **Gordon and Gotch (Sellotape) Ltd.** was showing a polyester film with an aluminium coating sufficiently dense and uniform to give absolute opacity. It will adhere to such surfaces as painted or chromed metal, plastics or glass, in or out of doors for six or more months. It is recommended, among many other things, for re-furbishing chromium plating, which speaks well of its finish.

John Gosheron and Co. Ltd. exhibited their very wide range of tapes including cellulose, vinyl, acetate, rigid vinyl, ethyl cellulose and polythene. One of the most interesting was an unplasticized vinyl protection tape with special adhesive giving ease of removal from all surfaces. Special inhibitors limit rusting on steel and staining and corrosion on copper and alloys. Gordon and Gotch



Workmanlike type and a bold, plain design characterize this new Tuboplast polythene tube, manufactured by Cascelloid of Leicester for a rubber glue marketed by Relief Decorations

have a number of these anti-corrosion tapes. Recent applications include a red pvc pipe-wrap applied to a fire hydrant pipe running for about 300yd. through a tunnel under Portishead

Continued on page 449

VIEWS *and* REVIEWS

IN a brave and engaging essay in the Bulletin of the Institute of Physics and the Physical Society, for August 1961, Professor H. Lipson, writing on 'Students' Essays', says that 'the rashest act a man can perform is to write an article about writing'. Let me be rash — again.

Educating Polymer Technologists

I recently wrote in commendation of the courses in Polymer Technology at the Northern Polytechnic (which, for the benefit of most foreigners and some Englishmen, I ought to point out is not in Manchester or Newcastle but in North London). I did not comment, because I was afraid of being accused of riding a hobby horse too much, that the courses do not include any formal instruction on writing the English essay, although that is one of the examination subjects.

Now I have been sent the syllabus of the Borough Polytechnic (also in London) which prepares students for the PI examinations. It likewise gives no instruction in writing English, though some at least of its courses include a foreign language. The technical subjects treated in these several kinds of courses at the Borough Polytechnic seem to me excellent, conveniently arranged, and competently taught — to judge by the list of eminent lecturers. Any student proposing to take up plastics technology would be well advised to get a copy of the syllabus from the Borough Polytechnic, Borough Road, London, S.E.1.

Not Even a Modicum

My chief concern now, however, is to inquire why the college students of our industry are not given a modicum of instruction in how to write their language. Even a single lecture would help.

Apart from the fact that the professional examinations of English students require a certain proficiency in English, employers demand an ability to express oneself reasonably well. As Prof. Lipson says, 'even if he is capable of the highest flights of intellectual thought he will be ineffective if he cannot say clearly what he thinks or if his writing is so dull that no one will persist in reading it'.

So he asks first of all for 'readability', and gives a candidate full marks on that score if his essay is one that is read straight through. In *his* essay, Prof. Lipson goes on to discuss other things, important things, but I want to pause long enough to remark that what I would like our teaching colleges to do would be to teach students *how* to write readable prose. It can be taught.

At one time, there used to appear in our somewhat-more-intelligent though less-precious literary weeklies, an advertisement depicting a man looking at once forceful and paternal, saying to us in sonorous tones, either (I really forget which) 'Let me be your father', or 'I can make you a master of English'. I never tested his abilities in either direction; truth to tell, I was sceptical. Nevertheless, I maintain that there are some tricks of the writing trade which can be taught and which improve the readability of amateur writing.

Bright and Breezy

I must not take the bread out of the mouths of honest teachers, but I may be permitted one or two comments. Colour is one valuable element in readable writing. Considering the richness of the English language, its varied sources and borrowings, it is a powerful instrument in knowing hands; it is rich and, therefore, can be subtle and exact at the same time as it is colourful and exciting. Yet we dole it out in dull ha'porths, rushing to cliche for colour.

The truth is, don't you think, that we are afraid of ostentation. If a new, bright word springs to our lips, we bite it back lest we be accused of showing off, of posing.

Unorthodox constructions also frighten us. Let us take heart. We are constantly breaking rules of grammar and canons of usage. You have only to spend five minutes with a real purist and pedant of language to learn that the simplest grouping of words is fraught with difficulties and susceptible of criticism; if you took notice of him you would be for ever dumb.

Like Professor Lipson, I come back to Lewis Carroll, to Humpty Dumpty, who asserted that in this matter of using words the only question is one of dominance: who is to be master, you or the word? There must be rules for using words — though the rules come after the words and their uses — and the better we understand the rules the more flexible will be our use of language. Reduced to its simplest, what we need is to strive to say what we mean as clearly, and precisely, yet as brightly, as we know how.

Consider the Other Fellow

The golden rule is that writing is done not for the writer but for someone else to read. It is the conveying of ideas from our mind to that of another, generally an unwilling receiver, whether by reading or hearing. So we have to adopt expedients to overcome his inertia, his distaste for us and our ideas, to insinuate them into his thoughts, in some rare instances to slam them in at pistol point. We use both persuasion and shock.

We must give him no time to think. We must keep him reading on, his eye moving from word to word and line to line. If we give him cause to stop often, he will stop altogether. That is why clarity is a basic element in readability.

To attain clarity — and it is not a quality that comes automatically — we need simplicity, logicality, and accuracy. These require thought. No one can write readably, therefore, without careful and sustained thinking, for what is being written and for how it is being said. We must learn to listen as we write. If you want to know more about that, you can find it in a paper 'Easy Reading — Hard Writing', written by G. A. Shires several years ago.

But when Lipson, Shires, and I have all had our say, we shall have said less than Kapp in his excellent treatise, 'The Presentation of Technical Information'.

We are spending large sums of money and hours of skilled teaching in putting knowledge into the heads of young people who will be the future technologists, scientists, and production leaders of our industry. Should we not spend a little more on teaching them how to tell us what results they get from using this knowledge?

Lesser Known Characteristics of SBR

A paper by Dipl. Ing. A. Dräxler, of Chemische Werke Hüls in *Gummi, Asbest, und Kautschuk*, August 1961,

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

Vol. 14, No. 8, pp. 726-736, although it is aimed principally at describing the SBR types available from Hüls, is of general value and interest because it surveys, in an eminently practical and useful manner, the use of SBR of various types in a variety of rubber compounds. I will pick out a few points here and there.

The paper compares the water absorption of similar vulcanizates of natural and SBR rubber after immersion in boiling water for 5, 10, and 20 days, and shows that the smoked sheet vulcanizate increased in weight by 8.45% after 20 days while that from the SBR increased by only 3.73%.

The compression set (ASTM hot-oven method) of SBR is also, it claims, better than NR, especially good values being given by sulphur-free vulcanization.

Weather Resistance

Weather resistance is improved by compounding with clay, kieselguhr, and suitable kinds of calcium carbonate, and also by softeners such as lanolin, coumarone resin, and emulsified plasticizers, but high proportions of mineral oils and bitumens should be avoided. These materials also improve the processing characteristics of SBR; extrusion is facilitated by the incorporation of light factice in the compound. Polythene is also a processing aid but does not improve weather resistance.

Dräxler gives special attention to the employment of SBR in cable making. For core and sheathing mixes, he suggests several suitable formulations, and for continuous vulcanizing recommends combinations of thiazole and thiuram accelerators in preference to the carbamates, in low-sulphur mixes.

There has been much investigation recently of the possibilities of SBR for special purposes, and this has led to the development of new types with different viscosities, especially 'nervy' types having been produced by long polymerizing. These high MW rubbers are particularly suitable for making high-pressure joints, seals, and gaskets, and also for flame-resistant belting, by incorporating chlorinated paraffins and antimony trioxide.

Certain rubber processes and products demand the opposite, that is a soft rubber of a low degree of polymerization and the paper discusses the possibilities of modern SBR grades in hose, tubing, and shoe soles.

The Mind of Researchers

It would seem to me a very remunerative plan that a large research organization should maintain a group doing research on research. Three lines might be profitable: to study how to find the best research subjects from the point of view of the sponsoring organization, to study the methods of research, and to study the mental make-up of researchers.

A witty unbeliever is said to have remarked, 'Thank God I'm an atheist'. In the same way (as Middleton Murry showed) Karl Marx, that individualistic personality, demonstrated to his own satisfaction that it is not individual personalities but blind mass movements which produce progress, innovation, and change. It was the Zeitgeist, not K. Marx, which produced 'Das Kapital'.

Success in research is not brought about by enthusiasm, however ardent, by the spirit of the times, by elaborate equipment in expensive laboratories, by high salaries, academic qualifications, sympathetic directors, though they all help, and often produce a good job of work. The outstanding research arises to a small extent from a happy chance, but mainly from the creative mind.

There is a need in any research team for the fertile creative individual who can come up with the ingenious solution and the bright idea.

It is doubtful whether such an individual ought to manage the team — though he may come to lead it without managing it. It is desirable that the research manager should be sympathetic with this unorthodox mind, should indeed be looking for it and trying to cultivate it, for the germ exists in many people and can be nurtured and increased.

It is compounded of enthusiasm for the project, eagerness without anxiety, intense absorption in the details, and conscious or unconscious powers of logical analysis, all leading to an intimate awareness of the shape and features of the problem. Then there is something more. It is partly the recognition that some of those features have a special significance and merit closer study or are likely hooking-on points for new ideas, partly the ability to relate to them a random memory or isolated fact or notion arising in the course of reading or discussion.

Perhaps it can be summed-up by saying that creativity in research is the ability to notice and to associate.

If I knew more than that I would not be advocating a group to do work on it. It may be that in all the psychological and sociological research projects at our universities, such work has already begun. Perhaps I am too much out of touch with modern management techniques to know that these matters are now well understood, that scientists are graded and selected by science and no longer by handwriting and the 'cut of his jib'. If this be so, do tell me. In a technological age, there seem to me to be few problems so urgent as to know how to find, if not to create, a creator.

Nuclear Simplicity

The Reinhold Plastics Application series started in 1957 and has already grown to greater proportions than was at first envisaged. The twentieth volume to be published has recently come into my hands and is a very representative example of this useful and handy collection of pocket-size books. *Plastics in Nuclear Engineering* is written by James O. Turner, materials engineer at the Lawrence Radiation Laboratory, University of California. In it he discusses the many practical plastics applications from the viewpoint of the engineer dealing with nuclear research apparatus.

He touches on the ways in which plastics can serve the nuclear scientist and also on the promising ways in which the nuclear scientist can serve plastics. For the engineer responsible for designing the Bevatrons and reactors, the bubble chambers and Perhapsotrons — and for making them work — this should prove a valuable guide to the use of plastics. To those who might expect it to contain a mass of more or less incomprehensible jargon, let me quote from the preface. 'You will find in it no history, no chemistry and no mathematics. It contains only discussions on a number of plastics applications that have been of value in the nuclear field, and of the effects of radiation on plastics' — a refreshingly simple approach to an enormously complicated subject.

CHARLES JENNINGS

MEN and MATTERS

A Review of People and Events

THE bewildering complexity of products available to the do-it-yourself enthusiast has reached such alarming proportions that the user now needs some help in choosing his materials. One enterprising manufacturer has gone a step forward in this direction in the services that it offers to the users of its products.

Bakelite Ltd., manufacturers of Warerite decorative laminates has, in common with other makers of similar materials, added almost daily to the number of patterns and colours available, until today the choice must be made from considerably more than the traditional Heinz 57 varieties.

The range of over 100 patterns has been subjected to expert scrutiny by a leading colour consultant, R. Thomas Day, FRSA, AIBD, who has planned colour schemes — matching and contrasting with each of the Warerite designs — for use in kitchens and bathrooms. A booklet giving the results of this study in domestic colour planning is now available from the Warerite Colour Advisory Service, Bakelite Ltd., 12-18 Grosvenor Gardens, W.1.

For each laminate pattern two alternatives are given, one a more adventurous type of scheme using brighter colour and generally a higher tone of colour contrast while the other makes use of a more reserved contrast.

While this service is an excellent idea, it falls short in one respect — it does not make it any easier to choose the Warerite pattern to start with!

Gas-Bags

Talking point in the Northern Gas Board at the moment are some man-sized inflatable rubber bags specially made by the General Rubber Goods Division of Dunlop at Manchester.

The problem of storing gas and supplying consumers while repairing

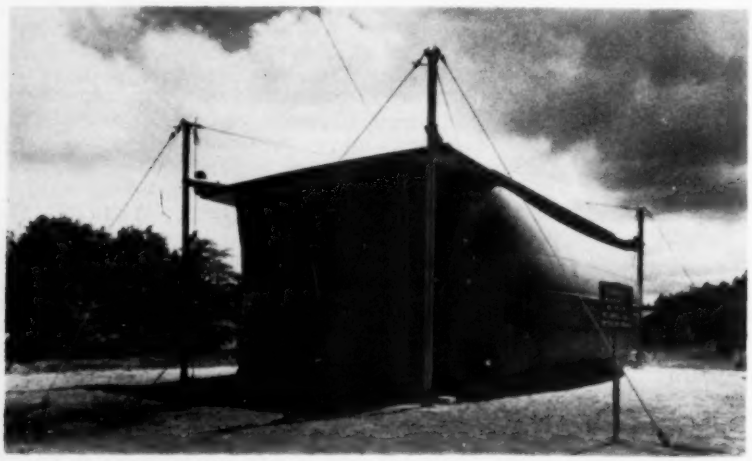
by Peter Richards

holders at three small gas works where no alternative storage was available, has been solved by the use of these bags as temporary gasholders which can be folded up and stored when not in use.

The rubber bags are rectangular in shape, each 35ft. long x 15ft. high x 15ft. wide with a capacity of 7,500 cu. ft. The fabric is a nylon weave coated with neoprene, has a weft and warp strength in excess of 250lb./sq. in., is approx. .025in. thick and folds into a package 8ft. x 3ft. x 2ft. weighing 640lb.

To provide a minimum district pressure of approx. 4in.wg, the top of the holder has to support 8½ tons of ballast.

Apart from prior rough levelling of the site and casting of four concrete corner blocks, the holder takes 48 man-hours for erection. The structure can be easily dismantled, transported, stored and re-erected when required.



This 7,500 cu.ft. capacity neoprene coated nylon bag made by Dunlop is being used as a temporary gas holder by the Northern Gas Board, Newcastle-on-Tyne
(See: Gas-bags)

P. W. Howard Retires

BTR Industries Limited has announced the retirement of its deputy chairman and former managing director, P. W. Howard, upon his reaching the age of 70. A really outstanding figure in the industry, Mr Howard retires after 35 years of active service with BTR. Following a period as sales manager of Pyrene Co. Ltd. and, later, of Pirelli Co. Ltd., he joined BTR (then British Goodrich Rubber Co. Ltd.) as general sales manager in 1926, becoming a director in 1949. He was appointed managing director in 1951 and held that office until 1959, having become deputy chairman in 1957.

He became, in 1929, a founder member of the Tyre Manufacturers' Conference. A past president of the Federation of British Rubber and Allied Manufacturers and former chairman of a number of its constituent Associations, he continues to serve on its Council and on its Executive and Finance Committees, and since 1946 has been chairman of its Overseas Trade Committee. He became a vice-president of RABRM — now RAPRA — in 1953 and has successively served as chairman of its Council and, since 1957, as its president.

Although retiring from active participation in BTR affairs, Mr Howard will be continuing much of his work with the FBRAM and the Rubber and Plastics Research Association.

In the Drink

A new distillery recently brought into production at Invergordon will increase Scottish output of whisky by almost 10%. The distillery has a capacity of 60,000 gallons weekly, and storage facilities for over 2.5m. gallons.

Nearly seven miles of mineral insulated pvc sheathed cables and 1,500yd. of pvc insulated steel-wire armoured power cables have been

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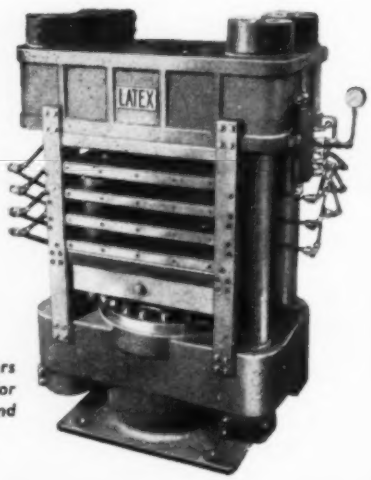

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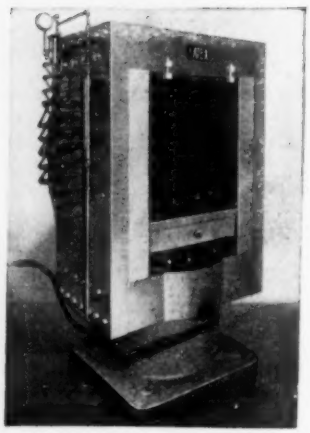

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supplied for the project by British Insulated Callender's Cables. So next time you take a 'wee drappie' spare a thought for the 'wee bit' plastics!

Robert Maitland Retires

Robert Maitland, sales director of BX Plastics for over ten years, has just retired.

He joined the British Xylonite Co. in 1922 as research chemist specializing in solvent recovery. In 1925 he became departmental manager for the production of hard rubber combs and later undertook the first thermosetting and injection mouldings at the company's factory at Hale End.

In 1939 the British Xylonite Co. was split and two subsidiaries formed, BX Plastics Ltd. and Halex Ltd. Mr Maitland became second in command to the BX Plastics' sales director, succeeding him in 1950.

Pirelli NCRT Scholarship

The Pirelli Scholarship, tenable for three years at the National College of Rubber Technology in London, has been awarded to Clive Miller, aged 17, of Burton Grammar School. The value of the scholarship is £360 a year.

Signing the Pledge

The imminent onset of winter has produced yet another story of an ancient hot-water bottle still in use. This one beats the unofficial record set up last year when a reader told me of a bottle purchased in 1940 that was still going strong (*RPW* May 7 1960, 700). A Dunlop 'Red Riding Hood' bottle has just come to light that has been in use for 25 years. The obvious inference to be drawn from this is that one should take nothing stronger than water.

Appointments in Brief

George Robertson has joined the staff of Artrite Resins Ltd. to take charge of the Technical Service Department.

* * *

ITS Rubber Ltd., Petersfield, has appointed R. L. Carter as works director. Mr Carter was with the Joseph Lucas organization for a number of years and latterly was works manager of the Avon Rubber works at Bridgend, and of the Heston Rubber Co.

* * *

L. J. Davies has been appointed a director of research by Associated Electrical Industries Ltd., responsible for research at the AEI establishments at Aldermaston, Harlow, Manchester and Rugby. He is succeeded as director of research of AEI (Rugby) Ltd. by Dr J. E. Stanworth.

Joseph Connolly has been confirmed as a director of Polymer Corp. Ltd., Sarnia, Canada. Mr Connolly is general organizer in Canada of the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the USA and Canada. He has been a member of this organization since 1928.

* * *

Dr John Gordon Davoud has been appointed executive vice-president of the Firestone Plastics Co. and Firestone Synthetic Fibres Co. He joins Firestone after 16 years with Courtaulds Ltd. Since 1959 he has been president of two subsidiaries of Courtaulds (Canada) Ltd., and a director of the Canadian organization and Courtaulds (North America) Inc.

* * *

BTR Industries Ltd. has appointed R. F. Howes as method study officer — responsible for method study on major engineering projects and plant reorganization throughout the group. Mr Howes has had several years' experience of method study and production control in the plastics division of I.C.I. Ltd. and with the de Havilland Engine Co. Ltd.

Polyglossary . . . by Symington

5(a) — 'Coagulating'

THE LEGAL ANGLE

Mistake in a Bill

By a Barrister

'In selling abroad, we cannot afford to be diffident in our salesmanship'. —RPW, July 15 1961.

Agreed! But we also cannot afford to be careless in our follow up — or inaccurate in our bills. Or can we?

Did you hear about the rubber firm which gained a mammoth order abroad — and then sent an invoice, with a nought left off? The customer paid up — delightedly. But when the British outfit discovered the mistake, there was murder in the accounts department. Naturally, a letter was written to the customer, apologizing for the mistake and demanding the balance. But to everyone's surprise and horror, the reply came back, 'So sorry. We cannot accept that this was a mistake. And, in any event, we have paid our bill, and if there is such a mistake, it was yours and we regret that we are not prepared to pay any further sum under this contract'.

The managing director called in his lawyer. 'What is the law', he asked, 'when a mistake is made in an invoice?'

First, the lawyer told him that where an over-payment is made by mistake, it can always be recovered. 'If someone pays too much — that is, over and above the contract price — he can always get his money back'.

'And if he pays too little?'

'It all depends. If a contract price has been agreed, that is the end of it. It is that price which must be paid. If the supplier asks for too little, he can still demand the balance. But if no price has been agreed and the supplier is to charge on a cost-plus basis, he may find himself in great difficulty if he claims that his original invoice was for too small a sum. It is possible that he may be stopped from demanding more — he having made a representation and the customer having acted upon it to his detriment'. 'But in our case, we can claim the balance?' 'You can'. Luckily for the accounts department, the balance was both claimed and recovered.

PLASTICS MACHINERY DEVELOPMENTS

Activity in Blow-Moulding

MANY NEW MACHINES CAN BE EXPECTED

By JOHN SHEARING

THERE is no danger of blow moulding techniques becoming obsolescent. None of the suppliers of equipment for this process is satisfied with the existing products and developments are continually taking place. We can, therefore, expect to see many new machines produced during the next few years as present difficulties are overcome.

The reason for this situation is not difficult to find. Most of the early machines used for blow moulding were fairly crude and certainly not first-class engineering units. Moreover, many initial difficulties, such as polymer degradation due to stagnation in out of the way corners, excessive flash at bottle necks and so on, had to be overcome. Apart from such features as these, there is a constant search for more rapid cycles, more even wall thickness and larger components so that new machines will have to be designed to satisfy all these requirements. Much progress has already been made and work still continues.

New Amigo Machine

The Amigo Machine Co. Ltd. is the well-known maker of the Blow-Master range of plastics blow moulding machines and extruders. Like all other companies in the field, they are continually improving and extending their range and have recently announced the addition of the Type 12 model.

The new machine has been specifically designed for the blow moulding of plastics containers in sizes ranging from 20oz. up to 120oz. capacity. Since they have themselves had many years' practical experience of container production, they are obviously well qualified to design a machine for this type of work. Apart from the many interesting features of the new machine, therefore, they have appreciated the importance of a mechanically simple yet rugged construction. Such features have thus been incorporated to give a machine which has a very smooth action and can be easily maintained.

Another important general point regarding the Amigo machines is the question of patent rights. As is well known, the patent situation as far as blow moulding is concerned is very complicated and manufacturers and users alike have experienced much trouble because of this. The new machine is fully covered by the Amigo patent and thus enjoys freedom from the intricacies of the patent problem which must be a source of immense satisfaction to users.

Machine Features

The Type 12 Model has all the characteristics of the Blow-Master range. However, a number of new features have been incorporated which make the machine a very valuable addition to the range.

The machine is normally designed for automatic production and the finished containers can drop from the mould station either on to a take-away conveyor or directly into a box. Thus the operator is only required to feed material to the extruder and take away the finished products once the box has been filled.

Although the machine is primarily for automatic production, arrangements have been made to allow the test and development of new moulds or materials. To enable the machine to be used in this way, separate manual controls have been provided so that each operation can be carried out individually. The machine is designed for use with one or two moulds. In this connexion a very useful and interesting feature is the method of change-over from single to double mould operation. This can be acheived merely by turning a switch. Rapid and accurate tool setting is possible since no guide pins are necessary. In addition, because of the specially designed suspension system, no drop occurs with heavy moulds.

Some machines have their controls distributed at wide points over the machine. This makes access difficult and is often dangerous. In the case of the Amigo machine, however, the control station is simple and compact.

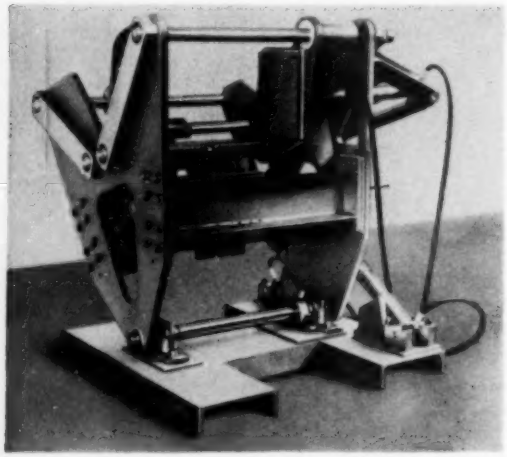
All movement is effected hydraulically, an increasing tendency nowadays with all types of machines. Because of this, the machine is smooth and vibration free, which is another contributory factor to the quality of the product.

When operating under an Amigo Type 10 Extruder, the hydraulic supply pack is part of the extruder which has a fully hydraulic drive. It is not necessary, however, to use an Amigo extruder and any available in the factory can be used. In such a case, however, a suitable power pack will have to be provided.

Output

It is always difficult to make estimations of output of blow moulding machines. Obviously the speed depends very much on the material used, the size of the component, the speed of cooling and the point at which ejection can be effected without distortion. The thickness of the article will obviously have an important bearing on this point.

Continued on page 451



The Amigo Type 12 plastics blow-moulding machine, which can be coupled to any type of extruder

PACKAGING EXHIBITION

Continued from page 441

Harbour and exposed to the highly corrosive effects of sea air. Polythene anti-corrosion tape is applied to hand-rails round the top of a gas liquor tank near which there are fumes of ammonia, nitric and sulphuric acids. This step has prevented numerous repaints.

A new development by Gordon and Gotch is the Sellotape Yellow Polyester Thermosetting Tape, a thin film insulating medium which remains stable at high temperatures. An interesting development of a purely practical nature is that it does not curl when dispensed which was previously due to build up of static electricity in the film. A typical example of the use of the material is to protect the two halves of the core of an insulating coil held together by metal straps. The tape withstands considerable pressure in fabrication and a temperature of 140°C. during the thermobonding of the wire.

Polyester Laminate

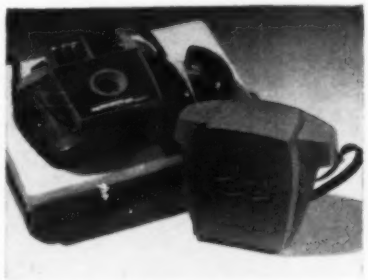
Three outstanding developments were featured on the stand of **Venesta Foils Ltd.** including a sterilizable pack, a freeze dehydrated food pack and a foil/polyester film laminate. The first product is a fully sterilizable foil laminate manufactured from a 0.001in. HD polythene faced on to a 0.025mm. foil which can be heated in an autoclave for 20-60min. at a temperature of 230°-240°F. The second product is a development of this, the two-part laminate being joined to paper and the resultant sandwich is suitable for the accelerated freezing of dehydrated foods.

The third development of Venesta Foils is claimed to be the toughest wrap known. It is a laminate of 0.025mm. foil and 0.0005in. Melinex which is particularly suitable for foodstuff applications. When combined with pulpboard or composition cork it is used as a liner in metal or moulded screw caps. A similar laminate, but using pure tin foil instead of aluminium, is employed in a variety of closures for the capping of spirits for world-wide export, the biggest application being with the Kork-N-Seal cap.

The biggest laminate of all is, of course, paper/polythene in one form or another and firms such as **Reeds** and **Bowaters** are actively working on such projects. **Telcon Plastics Ltd.** concentrated on the use of Telcothene for such purposes and also indicated the growing use of vinyl backed papers as well.

Other Applications

There were many other interesting exhibits on view but space only permits a brief selection of the more interesting to be described. In doing this it should be stressed that all the usual film and blown bottle exhibits were very much to the fore on many stands.



The light, snap-on cover for this Agilux Autoflash camera is moulded in Shell Carlona P polypropylene by I. T. and M. Plastics Ltd.

The really interesting exhibits on the stand of **Leicester, Lovell and Co. Ltd.** were the adhesives specially formulated for flexible packaging with Pliofilm, Saran, Melinex, treated polythene, Cellophane, cellulose acetate and vinyls. **British Celanese Ltd.** showed its Celawrap, a cast acetate breathing film; Celatron toughened polystyrene sheet and Propylex polypropylene sheet as well as many other films. **British Cellophane Ltd.** also had some interesting film products on display including its now well-known seeds packaged in water-soluble pva for direct burial; 'one-dose' sachets of washing powder in the same material; sweets twist-wrapped in polypropylene which gives a very high yield per pound; polythene coated cellulose and many other products.

Expanded products were very obvious and foamed polystyrene will clearly grow very much in importance. Three firms showing shock-proof mouldings made from it were **Export Packing Service Ltd., Venesta Plywood Ltd.** and **Expanded Plastics Ltd.** with their Polyzote. The latter material is now side-by-side with Rubazote (soft expanded rubber) and Onazote (expanded ebonite).

The coating of steel with pvc is now becoming big business and a valuable addition to industrial materials. **Robert Ingham Clark and Co. Ltd.** exhibited its Vibra-tint organic emulsion coating which can be applied by any conventional method and is recommended for treating glass. The company also supplies vinyls for the pre-coating of metals such as steel, aluminium or tinplate. Bakelite Ltd. is, of course, also very well-known in this field and its vinylite lacquers, so widely used as the lining for tin cases, hardly need any description.

We are all used to seeing the 'cocoon' packaging of large machine tools, although little publicity has been given to the technique in recent years. One snag with the method is that periodical inspection cannot be carried out without opening up the skin. The Driclad system of **Export Packing Service Ltd.** is a useful alternative and consists of a range of re-usable covers fabricated from reinforced plastics and closed by means of a special zip fastener made from two plastics extrusions. Provision for desiccation can be made.

It is regrettable that some firms do not give a clue to the composition of their products. However, the Pyrokure of **British Sisalkraft Ltd.** is worth a mention in spite of the deficit. It is a flexible waterproof, vapour-proof barrier with a special laminating material formulated to emit a gas which smothers the flame should a fire arise. The barrier material is a combination of kraft and foil with glass fibre reinforcement bonded together with the flame extinguishing adhesive.

Last, but far from least, was the Whiffen and Sons Ltd. stand which was devoted to Ralsin in packaging, about which we will undoubtedly hear more. From the packaging point of view it forms a clear, sterilizable and tough film. It can be printed, will hold vacuum and is resistant to so many contaminants. It is an ideal pack for marketing special sauces, complete meals and puddings.

Machinery for the conversion of film was, of course, very much to the fore and is covered in an article which will appear in next week's issue of RPW.

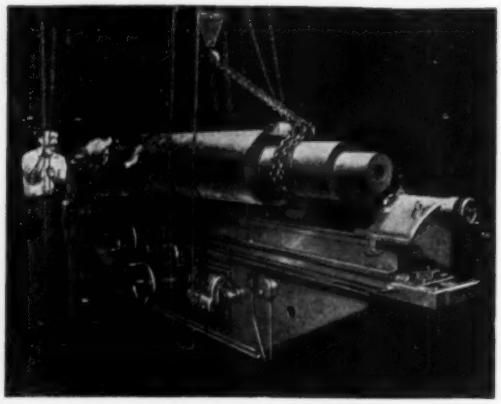
Export Training

An export training centre for top management, the first of its kind in Britain, was opened at Sundridge Park, Kent, last week. It has been set up by the existing management centre at Sundridge Park to help the country's export drive by providing comprehensive training facilities on a residential basis.

pH from Pye

Following an enquiry received at the British Trade Fair in Moscow this year, an order for industrial pH measuring, recording and controlling equipment worth £15,000 has been obtained by W. G. Pye and Co. Ltd. from the official USSR buying agency, Mashpriborintorg.

MILLS CONVERTED TO NEW SAFETY STANDARDS



INSTALLATION MAINTENANCE

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PLASTICS MACHINERY DEVELOPMENTS

Continued from page 448

With these considerations in mind, Amigo has made an approximate calculation of the output for an 80oz. container. It is thought that this can reasonably be expected to be in the region of 150 containers per hour when using the single mould. If a double mould is used, the output is obviously not doubled, and in this particular case the rate is improved up to 220 per hour.

Easy Maintenance

Although much thought has been given by manufacturers to the design and construction of the machine, the important aspects of maintenance are often imperfectly dealt with. In particular, for those machines which are to be exported, no provision is made for replacing broken parts so that the unfortunate user may have many weeks delay in obtaining replacements from the country of origin.

Amigo has taken this matter into consideration and all the bought-out parts are exclusively makes which are readily available throughout the world. The machine has been designed for a minimum of maintenance and is a solid engineering job with no complicated valve gear. All machine movements are consecutive and stoppages are, therefore, immediately diagnosed.

A further important feature of the machine is the lubrication required. In the case of the Type 12 model, it is only necessary on the tie bars and pivot bearings which again means that maintenance will be reduced to a minimum.

Shoe Mould Lubricant

The British United Shoe Machinery Co. Ltd. has been carrying out tests on Ambersil Formula 2 (manufactured by Amber Oils Ltd.) as a mould lubricant and protective fluid for use with vulcanizing shoe machinery. The product prevents adhesion of rubber to the moulds, helps to retain the gloss on the finished surface of the moulded sole and edges, and maintains the mould in good condition when not in use.

Stocks of the fluid are now being held at all branches of BUSMC.

Ambersil Formula 2 is a silicone fluid supplied in aerosol form. Flexible extension jet nozzles are available for use with the aerosol to enable the spray to be easily applied to the innerside of welt plates. The fluid has to be used sparingly otherwise rubber flow may be retarded, causing malformation in sections of the welt and delamination of the heel.

Breathing Paint from Matthews

INCORPORATES GOODYEAR SYNTHETIC RUBBER RESIN

THE Bristol firm of Henry Matthews and Co. Ltd. is to market a new rubber-based paint called Kolorplas. This incorporates Pliolite S-5, a synthetic rubber resin made by the chemical division of the Goodyear Tyre and Rubber Co., Akron, USA.

Testing a batch of the new paint at the Bristol plant of Henry Matthews

The paint, which is the result of two years' research by Leonard Perry, head chemist of Henry Matthews, can be used for interior decoration and, in addition is said to have a number of properties which make it particularly suited to exterior application.

Properties include: resistance to the highly corrosive alkalies inherent in all construction materials containing cement and controlled self-cleaning — heavy rain will clean the paint but will not damage the surface. The paint 'breathes' — it keeps damp out but allows internal moisture vapour to escape.

The paint is said to give a good finish on concrete, stucco, hot plaster, porous brick, asbestos board, cement and other surfaces. It can be applied in most weathers and has a good adhesion. It surface-dries quickly — 1½hr. to 2hr. — with an eggshell finish. A second coat can be applied after 24hr. Covering capacity is 60-80 sq. yd. per gallon, according to the nature of the surface.

The protective qualities of paint incorporating Pliolite S-5 are recognized by the US Government for external masonry, and their paint specifications now demand a styrene-butadiene copolymer solvent type paint.

The paint is supplied in a white base which can be tinted to at least 64 different pastel shades using eight basic Kolorplas tinters.

No Official Strike for 21 Years

The Rt. Hon. John Hare, Minister of Labour, will be the principal speaker when the rubber industry celebrates 21 years without an official strike.

At a dinner in the Guildhall, on September 26, Mr Hare will propose the toast to the industry's National Joint Industrial Council which will have come of age.

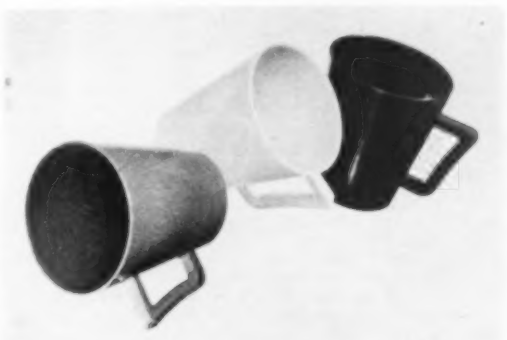
The efforts of the NJIC have led to good labour relations, and its work on accident prevention and industrial health have set a pattern for other industries.

Sir Edward Beharrell, chairman of the Dunlop Rubber Co. Ltd., will preside at the dinner.

Bristol Chooses Pirelli

The 407, first of a new line of Bristol car with a 5.2 litre power unit, which will be introduced to the public at the Paris Salon and Earls Court Motor Show, contains seats sprung with Pirelli webbing.

The seats, which are of the 'tailored to fit' contoured type, are adjustable for rake over a wide range. The Earls Court Show is from October 18-28; the Paris Salon takes place next April.



Part of a new range of beakers injection moulded by Clean Plastic (Pontyclun) Ltd., Glamorgan, in British Resin Product's high-density polythene

Rubber and Plastics Stock Market

A REVIEW OF PRICES AND TRENDS

THE easy days of making profits have passed. Competition from now on is going to get tougher, even if one ignores the problem of the Common Market. It will be some time before we hear again the phrase 'you've never had it so good'. Investors generally can expect more and more of the news from company boardrooms to be glum and in some cases downright startling. Now do not get me wrong on these points. Although it is unusual for me to be in such a pessimistic mood I feel that it is time to face some of the facts which suggest that the immediate outlook from an investment point of view is somewhat uncertain. More and more of the big companies that have reported to shareholders recently have produced disappointing results. Most of the firms that we spotlight in this issue, for instance, had some kind of unpleasant item which caused a bit of eyebrow raising among investment circles in the City.

Take the case of the half-time statement from the MONSANTO chemical giant. In the grand manner that one expects from Sir Miles Thomas, the chairman, and his fine team of workers, sales of the groups were boosted from £10,373,600 to £10,671,900 in the six month period to end of June last. But the net income figure before tax contracted from well over the £1m. mark to £826,300 and deducting the estimated taxes net income is down from £651,300 to £381,000. For the full 12 months of 1960 the net balance was £1,416,600. Glumly Sir Miles pointed out that it was apparent from the lower profits that the trend towards reduced margins which began to develop in the second half of last year has been accentuated during the period under review. Worldwide reduction in the prices of many products had its inevitable effect on domestic prices levels as well, with the result that the modest increase in sales turnover did not reflect the substantial increase in the tonnage of the company's production. The magnitude of the declines in price overshadowed significant improvements in manufacturing costs and important economies in all items of expense. The export performance of the group has been maintained with 35% of sales turnover going abroad. Shareholders who must have read this statement with something approaching despair must have at least been pleased that the first interim is to be repeated at 5%. For the whole of 1960 they received a total of 15%. Since the news the shares have dropped to a new low of 17s. 3d. and to date are just a fraction above this price.

Continued on page 454

Share Price Movements

Par Value	Company	1961 High	Low	Sept. 2	Latest
£1	A.E. Ind. Ord.	48/6	35/-	35/-	38/3
5/-	Albright & W. Ord.	29/6	22/3	23/-	23/-
£1	" " " 5% Pref.	17/3	13/-	13/-	13/-
5/-	Anchor Chemical Ord.	25/6	16/-	17/9	17/9
4/-	Airfix	62/6	34/6	57/-	62/3
4/-	" Non Voting	58/9	33/6	56/6	58/9
5/-	Andersons Rub. Ord.	—	—	3/9	3/9
£1	Angus Geo. Ord.	83/-	58/6	63/9	66/-
5/-	Ault & Wiborg Ord.	17/-	12/9	14/3	13/9
£1	Avon India Rubber Ord.	46/6	30/-	37/6	36/9
£1	" " " 6% Pref.	19/3	17/6	17/6	17/6
10/-	Bakelite Ord.	66/3	42/3	45/-	47/-
£1	" 6% Pref.	19/3	16/6	17/6	17/-
£1	Baker Perkins Ord.	59/6	40/6	47/-	47/-
4/-	Bank Bdg. Rubber Ord.	3/6	1/9	2/3	2/3
4/-	Bettix	11/9	7/6	9/3	9/-
4/-	Brammer H. Ord.	17/-	13/9	14/3	13/9
10/-	Bridge, David Ord.	60/-	28/9	28/9	28/9
5/-	Bright, John Ord.	9/6	6/3	6/6	6/6
5/-	Brit. Blting. & Asb. Ord.	24/-	17/6	20/3	19/3
£1	" " " " Pref.	—	—	13/3	13/3
5/-	British Electronic Indus.	15/6	9/6	9/10½	11/6
£1	BICC Ord.	62/6	49/-	57/6	59/-
5/-	BTR Ind. Ord.	18/9	9/6	10/3	9/9
£1	" " 7½% Pref.	21/6	19/9	20/-	20/-
10/-	Castrol Ord.	52/-	37/-	38/3	41/-
£1	Courtaulds Ord.	47/6	32/6	32/9	34/6
£1	" 5% 1st Pref.	16/-	13/9	13/9	13/9
£1	" 6% 2nd Pref.	18/3	15/9	16/-	16/-
4/-	Cow, P. B. Ord.	10/6	7/6	9/3	9/3
£1	" " 5% Pref.	14/3	12/9	13/-	13/-
1/-	Dannimac Mfg. Ord.	15/3	10/6	11/3	11/-
10/-	De La Rue Ord.	70/-	51/-	52/-	53/9
£1	" " " 3½% Pref.	10/6	9/6	10/6	10/6
10/-	Distillers Co. Ord.	41/3	31/-	35/9	37/-
£1	" " 6% Pref.	20/3	17/6	17/6	17/6
£100	" 5% Conv. Loan	£96	£90	£91½	£91
£100	" 5½% Unsec. Loan	£86½	£73	£75	£74
10/-	Dunlop Rubber Ord.	29/-	21/6	25/3	26/9
£1	" " 5½% Pref.	16/-	13/9	14/6	14/6
£100	" 3½% 1st Debs.	£69	£67	£69	£68
£100	" 4½% 2nd Debs.	£79	£74	£76	£75
£1	Eng. Elect. Ord.	40/6	29/9	29/9	30/-
4/-	Ebonite Cont. Ord.	8/6	5/10½	6/-	6/-
£1	English China Clays Ord.	117/6	80/-	93/9	97/3
£1	Goodyear Tyre 4% Pref.	11/6	9/9	10/6	10/-
5/-	Greeff Chem. Ord.	37/6	22/9	24/6	24/-
10/-	Greeff Chem. 5½% Pref.	8/3	7/-	7/3	7/3

Par Value	Company	1961 High	Low	Sept. 2	Latest
4/-	Greengate & Irwell Ord.	6/9	4/9	4/9	4/9
5/-	Hackbridge Hldg.	6/9	4/9	5/3	6/-
£1	Harrisons & Crosfield Dd.	57/6	47/6	48/9	48/9
1/-	Hunt & Moscrop Ord.	2/3	1/3	1/9	1/9
£1	Imp. Chem. Ord.	81/6	63/-	67/1½	68/9
£1	" " 5% Pref.	16/3	13/6	14/1½	14/6
£100	" 4½% Unsec. Loan	£83	£76½	£78	£79
£100	" 5½% Conv. Loan	£93	£86	£87½	£87½
5/-	Laporte Ind. Ord.	30/9	22/-	23/3	22/9
£1	" " 7½% Pref.	23/-	20/-	20/-	20/-
£1	Leyland & Birm. Rubber Ord.	59/3	46/3	49/6	48/-
£1	" " " 6% Pref.	18/9	15/-	15/-	15/-
2/-	London Rubber	15/6	9/6	13/3	13/-
£1	" 6% Red. Cum. Pref.	20/-	16/9	17/6	17/6
£1	McKechnie Bros. Ord.	43/-	27/-	40/6	40/6
£1	" " 'A' Ord.	45/-	35/-	35/6	35/-
£1	" " 6% Cum. Pref.	18/-	16/-	16/6	16/6
5/-	Monsanto Chem. Ord.	27/6	17/3	20/-	17/6
£1	" " 3¼% Pref.	12/6	11/-	11/6	11/-
£100	" " 6% Debs.	£98	£88½	£88½	£89
5/-	Miles (H.G.) Hldgs. Ord.	7/9	7/-	7/6	7/6
2/-	Movitex	7/6	5/-	5/3	5/-
£1	North British Rubber	21/3	12/-	13/-	12/6
5/-	Northwestern Rubber	13/-	9/-	12/-	12/-
5/-	Plastic Enginrs. Ord.	40/-	28/6	29/-	28/6
10/-	Projectile & Eng. Ord.	50/6	22/6	33/-	38/9
5/-	Redfern Holdings Ord.	3/9	2/9	3/-	3/3
2/-	RFD Ltd. Ord.	6/3	3/6	4/6	4/6
£1	" " 5½% Pref.	15/-	11/3	11/3	11/3
2/-	Rubber Imp. Ord.	6/3	3/3	3/9	3/6
2/-	" " 'A' Ord.	5/-	2/6	2/9	3/-
£1	" " 5% 1st Pref.	13/3	11/3	12/3	12/3
5/-	Rubber Reg. Ord.	18/3	14/6	14/6	14/6
4/-	Shaw Francis Ord.	24/6	14/-	14/-	14/-
£1	Shell Ord. (Reg.)	140/-	108/-	117/6	113/3
2/-	Silentbloc Ord.	10/6	8/3	9/-	8/9
5/-	Storey Bros.	46/-	34/-	34/-	35/-
2/-	Sussex Rubber Ord.	2/7½	1/9	1/9	1/9
5/-	Sutcliffe Speak Ord.	18/6	12/6	12/6	12/6
£1	Tootals	35/6	28/-	28/-	27/6
£1	Turner & Newall Ord.	78/-	55/-	62/6	63/3
£1	" " " 7% Pref.	21/6	19/-	19/6	20/3
5/-	Universal Asbestos Ord.	27/-	20/-	22/6	23/-
£1	Venesta Ord.	76/-	59/9	62/6	60/-
5/-	Viscose Dev. Ord.	16/3	13/3	13/9	13/9
5/-	Warne W. (Holdgs.) Ord.	21/6	14/9	18/4½	18/3

Plantation Newsletter

NEW DUNLOP COMPANY SHARE OFFER

by our Malayan Correspondent

FROM KUALA LUMPUR

INQUIRIES from hundreds of people have flooded Malayan bankers and sharebrokers following the announcement that Dunlop Malayan Industries Ltd., the new Dunlop company recently incorporated in the Federation, is to offer 4,680,000 ordinary shares of $1 each (2s. 4d.) at par, for subscription by the public.

They have been told to wait until October 2 when applications will be open. The minimum application will be for 500 shares. It is understood that the public will have at least five days to apply for the shares.

The announcement that the shares would shortly be offered was made by the Malayan Industrial Development Finance Ltd., which has entered into an arrangement with the Dunlop Rubber Co., to sponsor and underwrite the public flotation for their new Malayan company.

It was stated here that at the new tyre plant to be built in Malaya, Dunlop will also manufacture tyres and tubes for Goodyear and India so that the public will have a choice of competing local-manufactured brands.

Earlier it was stated that the factory would be built in 18 months' time and would provide employment for 600 people when in full production. Initially 39% of the proposed ordinary share capital of $12m. will be open to public subscription.

In addition, Dunlop will set aside 10% of the capital for Malay participation. At the start, the factory will produce about 400,000 tyres a year — 200,000 to supply Malaya's entire annual need and the other 200,000 for export. It will use about 2,000 tons of Malayan rubber a year working on this capacity output.

The prospectus will be published on September 26 and applications will be open on October 2. The general indications are that the response to this public subscription will be very good.

Said one leading Kuala Lumpur broker: 'There were a lot of inquiries even before the announcement that there would be shares for the public'.

Replanting Warning Heeded

The warning given last year that it might be necessary to apply certain sanctions against estate owners who failed to take advantage of the Government's estates scheme to replant, has apparently been noted. This warning was aimed at 616 estate owners comprising a total of about 160,000 acres, the majority of which were in the 100-500 acre group, and who had not started any replanting at all.

The Minister of Commerce and Industry, Inche Mohamed Khir Johari, said this week: 'I am pleased to say that the situation has so improved that I think there is no need for me to think of further statutory measures'.

As at July 31 this year, it was reported that the figure of 616 unregistered estates had been reduced to 171, with a replanting eligibility of only 4,763 acres.

As far as replanting on smallholdings is concerned, the tasks that lie ahead will be different from those in the past. Many of the holdings which will be replanted in the future will be located in more remote areas.

They may not be easily accessible and the people the replanting officers will have to deal with may be illiterate. Another problem is that while replanting officers must do their best to persuade smallholders to join the Government replanting scheme they must also at the same time see that the smallholders who have started with replanting carry on successfully to the end.

Waiting for Payment

As the Minister pointed out, there was a large percentage of holdings which have not received their final payments (Government replanting grants). He said he understood that out of a total of 117,800 acres of replanted acres accepted into the smallholders replanting scheme from 1953 to 1956 and which have passed out of the scheme as at December 31 1960, only 81,700 acres (or 70% of this total acreage) have been paid their final grants.

The remainder, comprising 30% of the acreage accepted for replanting, had been deferred for one reason or another.

'I appreciate that it is not possible for the board to continue to pay the smallholders who fail to upkeep their replanted holdings according to the accepted rules of good agricultural practice, nevertheless it is imperative that the patience and skill of officers of the Rubber Industry (Replanting) Board with the assistance of the Smallholders Advisory Service of the RRI, must be employed to the utmost to bring these deferred holdings back into the scheme', he said.

This was very important, the Minister continued, as what they wanted to see were successful replanters and not just smallholders who joined the scheme and then fell by the wayside as the years went by.

Malaya's Minister of Finance, Mr Tan Siew Sin, who has had long experience in the rubber industry because of his family's estates, has just spent several days in England making a thorough study of natural rubber research going on there. Mr Tan broke his journey before going to Ghana to attend the Commonwealth Finance Minister's Economic Consultative Council meeting. He toured the Natural Rubber Producers Research Association centre at Welwyn Garden City and had talks with Mr P. F. Adams, secretary-general of the International Rubber Study Group. (See page 428.)

Rubber Statistics

UNITED STATES — MALAYA — SOUTH VIETNAM

CONSUMPTION of new rubber in the United States for July amounted to 110,215 long tons, a 14.29% decrease below the 128,588 long tons consumed during June, according to the Rubber Manufacturers' Association Inc. This decrease is due mainly to vacation shutdowns.

Consumption of all types of synthetic rubber in July amounted to 79,580 long tons as compared with June's consumption of 92,712 long tons. Synthetic rubber during July accounted for 72.20% of total new rubber consumption, surpassing the previous high ratio of 72.10% reached last month.

Natural rubber consumption amounted to 30,635 long tons in July, as compared with 35,876 long tons consumed in June.

Production of synthetic rubber increased during July with 111,922 long tons as compared with 107,493 long tons for June.

Reclaimed rubber consumption for July was 17,130 long tons, while last month's figure was 21,983 long tons.

Malaya

Imports of rubber into Singapore and Malaya during July amounted to 38,007 tons (actual arrival 38,143 tons) as shown by final documents received, according to preliminary figures issued by the Chief Statistician. This compares with the June figure of 36,886 tons (actual arrivals 35,250 tons).

The July figures include 18,713 tons imported on provisional permits in previous months for which final documents have been received, and exclude about 18,849 tons imported during the month for which final documents have not yet been received.

South Vietnam

The rubber production in South Vietnam increased by over 1,000 tons in the first six months of 1961 over the first half of 1960, reaching a figure of 26,746 tons.

Rubber Markets

LONDON

The London rubber market was fundamentally quiet during the week. The main feature of the period was a fairly good trade demand for September shipment No. 1 RSS in the cif market which most days developed around mid-afternoon.

Some trade sources considered this order to be fairly substantial and said they thought that it had not yet been fully satisfied. Business in the landed positions was confined to small short-covering deals.

The market as a whole fluctuated narrowly, largely in accordance with movements at Singapore, but finished the week virtually unchanged on balance.

Latest prices are as follows:
No. 1 RSS spot: 25¼d.-25¾d.

Settlement House:
October 25¾d.-25⅞d.
November 25¾d.-25⅞d.
December 25¾d.-25⅞d.
October/December 25¾d.-25⅞d.
January/March 25¾d.-25⅞d.
April/June 25¾d.-25¾d.
July/September 25¾d.-25¾d.

No. 1 RSS cif basis ports:
September 25¾d.-25¾d.
October 25¼d.-25¼d.

Godown:
October 85¾ Straits cents.

LATEX

Centrifuged 60% latex per gallon in drums, seller, September, October, 14s. 7d., cif European ports. Spot, seller, 15s. 1d. Bulk, seller, d.w. 14s. 6d. Normal, seller, September, October, 11s. 4d.

NEW YORK

The New York rubber market ruled as under on September 11:

DEALERS' PRICES

	US cents per lb., ex-dock	
	Sept. 11	Previous
No. 1 RSS, Sept. ..	30½a	30a
Oct. ..	30½a	30½a
No. 2 RSS, Sept. ..	30⅜a	30⅜a
Oct. ..	30½a	30a
No. 3 RSS, Sept. ..	30½a	30½a
Oct. ..	30a	29⅞a
No. 1 RSS, Spot ..	30⅜n	30½n
No. 3 amber blanket crepe, Sept. ..	27⅛n	27⅛n

FUTURES—REX CONTRACT

	Sept. 11	Prev. Close
Sept. ..	30.50b–31.50a	30.70b–31.10a
Nov. ..	29.50b–30.15a	29.90b–30.05a
Jan. ..	29.60b–29.80a	29.80b–29.90a
March ..	29.60b–29.80a	29.65b–29.80a
May ..	29.50b–29.70a	29.50b–29.70a
July ..	29.50b–29.70a	29.50b–29.70a
Sept. ..	29.50b–29.70a	29.50b–29.70a

Sales: Nil. Tendency: Quiet.

Rubber futures were a shade higher on September 11, reflecting the markets in London and Singapore, but activity left much to be desired. Physical rubber was very slow.

SINGAPORE

The market opened steady on September 11 and soon went ahead on rather better buying interest. Reports of difficulties in contract negotiations at General Motors brought a reaction but this was short-lived. The international political situation was a much stronger factor. The market was slow to open in the afternoon, but following renewed buying interest in lower sheets and in view of a scarcity of sellers, prices firmed to close at the day's high. After hours the market closed steady but quiet. No. 1 September buyers was 1¼ cents above Friday's final level at 86¾ Malayan cents per lb.

	Malayan cents per lb., fob Malayan ports to open ports	
	Sept. 11	Prev. Close
No. 1 RSS, Sept. ..	86¾–87¼	85¾–86
Oct. ..	87¼–87½	86½–86⅝
No. 2 RSS, Sept. ..	86¼–86⅜	85⅛–86½
No. 3 RSS, Sept. ..	85¼–85½	83⅜–83⅝
No. 4 RSS, Sept. ..	82⅞–83⅜	81½–82
No. 5 RSS, Sept. ..	77¼–78¼	76¼–77
No. 1 RSS, Spot ..	86⅛–87	85½–85¾
No. 3 blanket thick re-milled crepe, Sept.	79 –80	77½–78½
No. 1 fine pale crepe, Sept.	97½–98½	96 –97
2X thin brown crepe, Sept.	76 –77	75½–76½

Tendency: Steady, quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 170.80d. per gallon.

AMSTERDAM

The Amsterdam rubber market ruled as under on September 11:

	Guilders per kilo	
No. 1 RMA	Sept. 11	Previous
September ..	2.42	2.41
October	2.42	2.41
November ..	2.42	2.41
December ..	2.42	2.41
Oct./Dec. ..	2.42	2.41
January	2.42	2.41

Sales: Nil. Tendency: Steady.

DJAKARTA

	Rupiahs per kilo	
	Sept. 13	Previous
Spot No. 1 Priok ..	36.50b	36.50b
Spot No. 2 Priok ..	35.50b	35.50b
Spot No. 3 Priok ..	34.50b	34.50b
No. 1 fine pale crepe, spot	34.00b	34.00b

Tendency: Very quiet.

CEYLON

The price of No. 1 RSS at Colombo on September 11 was 105½ (104) Ceylon cents per lb.

BANGKOK

The price of No. 1 RSS at Bangkok on September 11 was 27.75 (27.75) US cents per lb.

STOCK MARKET

Continued from page 452

LEYLAND AND BIRMINGHAM RUBBER was another well-known firm to tell of a setback in trading. Profits of the group fell from £934,755 to £854,696 after a lower tax take. But the dividend was maintained at 20% with a final payment of 15%.

From a profit to a loss . . . this is what happened to E. K. COLE, which is now part of the British Electronic Industries organization. The size of the loss was £665,429, compared with a profit of £675,031. And the company was unable to pay a dividend against 22½%. But in spite of this the BEI directors are paying out 15% which is in line with the forecast made at the time of the 'marriage' between Ekco and Pye.

F. W. BERK also returned lower profits for its six-monthly trading period. After all charges, except tax, they totted up to £366,894 compared with £367,653. This, despite the fact that sales rose 5.2% to £4,744,000. As forecast, the interim is raised from 2¼d. to 2¾d. on the bigger capital. The board stressed that the increase is only intended to reduce the disparity between payment and does not infer a higher total in respect of the current year.

To speed up delivery times and to provide an 'on-the-spot' service for customers in Germany, BTR INDUSTRIES has, in anticipation of Britain's entry into the Common Market, formed a wholly-owned subsidiary in Cologne — BTR Industries GmbH.

This new company will, at the outset, manufacture Hi-Flex hydraulic hose assemblies to meet British, American, German and French standards and sizes. The market will include primarily earthmoving, agricultural, mining and hydraulic machinery manufacturers, together with the iron and steel industry.

DUNLOP NIGERIA INDUSTRIES, the Nigerian tyre manufacturing concern of Dunlop Rubber Co., England, is to have an authorized capital of £2.5m., of which £1.5m. will be issued. Dunlop Rubber has decided to hold 51% of that amount and the remainder will be distributed on a country-wide basis.

Canadian Asbestos

Shipments of asbestos from Canadian mines in July increased 10.8% to 102,490 tons from 92,529 tons in the corresponding month last year. Decreases in each of the first three months of this year were more than offset by increases in all the following months, and shipments in the January-July period rose 1.6% to 609,621 tons from 600,151 in the same seven months of 1960.

Shipments from mines in Quebec were up in the month to 96,888 tons from 87,447 and in the seven-month period to 568,229 tons from 560,949.

Industry INTELLIGENCE

Technical Data

Philprene 1808 Compound

Rubber Chemicals Sales Bulletin No. 36, issued by Phillips Chemical Co., Akron 8, Ohio, gives details of a compound based on Philprene 1808.

Compounds meeting SC specifications must possess moderate resistance to swelling in low aniline paint oils. Normally such requirements are met by using the acknowledged oil-resistant type elastomers.

A compound based on Philprene 1808 (100 parts cold rubber, 75 parts Philblack O and 50 parts Philrich 5 oil) has been developed to meet the SC-615-BE, specification. By virtue of the substantial quantity of oil in the polymer, the resulting Philprene 1808 compound absorbs very little of the oil in which it is immersed and qualifies as a medium oil resistant stock.

This information illustrates that SBR compounds can successfully meet certain SC specifications and, because of their lower gravity and lower cost, offer economic advantages to the compounder.

Hard Polyurethane Rubbers

I.C.I. Ltd., Dyestuffs Division, has issued No. 6 of urethane chemicals literature. This deals with hard polyurethane rubbers made from Daltoflex 1 and Suprasec M. Daltoflex 1 is a polyurethane raw rubber for processing on conventional rubber machinery. It is cured by means of Suprasec M, a high-boiling liquid isocyanate which has a very low vapour pressure at normal processing temperatures, and which consequently may be regarded as free from the particular toxic hazards associated with liquid isocyanates, such as tolylene diisocyanate. Daltoflex 1 differs from natural and synthetic rubbers in that no accelerators are used in processing, but because of the slow reaction (cure) that occurs between Suprasec M and the Daltoflex 1 at room temperature, compounded stocks have only a limited storage life.

The booklet, which gives general information and tables of properties of rubbers from Daltoflex 1 and Suprasec M, can be obtained from any I.C.I. sales office.

Butyl at High Temperatures

The resistance of butyl vulcanizates to high temperatures is described in Technical Information Sheet 46 issued by the Esso Petroleum Co. Ltd., Chemicals Division, 50 Stratton Street, London, W.1, from whom copies may be obtained.

Butyl rubber has an established reputation for good long-term heat stability at intermediate temperatures up to 350°F. It is basically more stable to oxidation, which accounts for its ability to retain its flexible rubber-like properties longer than other rubbers that harden and embrittle. Use of this better engineering material is responsible for the extended life and higher performance ratings of electrical insulation, tyre curing bags, gaskets and other commercial rubber articles.

Recent compounding and cure technology has further improved the performance of carbon black loaded butyl articles to meet peak load temperatures of 500°F. This report covers performance of several resin cured butyl vulcanizates containing a mineral filler after ageing at 300-500°F. temperatures.

Machines, Materials and Equipment

Small Dust Filters

In modern methods of manufacture, blending, storing and mixing, and in the increase of pneumatic conveying of powder materials, there is also an increasing demand for a small and compact piece of dust filter equipment for use as either a primary or a secondary filter, in cases where a fan or pump is

already part of the main machinery.

An answer to this demand is the bin type adaptation of the Dallow Lambert Unimaster Venting Unit fitted with pad type fabric filter of either cotton, nylon or terylene giving 100 sq. ft. of filter area, together with motorized shaking gear and a 4 cu. ft. quick-release dust container.

Fanfold Stencils

Fanfold Ltd. is now marketing Weber Tab-on and Continu-matic Stencils. The use of these stencils, together with quick drying inks, provides an economical and flexible method of marking plastics, rubber and other non-porous substances. The stencils are cut by typewriter, ball-point pen or pencil and slipped into a small hand printer which contains its own ink reservoir. The objects to be marked are touch-stencilled with a clear and permanent print, and it is claimed that 3,000 to 5,000 prints can be made before the ink reservoir requires re-filling.

Stencils can be supplied pre-cut with static information, variable information being added before use. Further details can be obtained from Fanfold Ltd., Bridport Road, London, N.18.

High Speed Cap Packaging

An interesting installation for the accurate counting and packing of bottle and jar caps has been made at the Poole factory of the Wallis Tin Stamping Co. Ltd. Caps, which may be of any size or shape, coming from the cap forming machines are fed onto a long and wide conveyor belt along one side of which are situated a bank of standard BC4 electronic photo-cell decade batch counters. Guide rails on the conveyor belt divert streams of caps to each of the batch counters which simultaneously deal with the whole output. The caps, on diversion, are passed through a light beam in the photo-cell and light heads and are then allowed to pass down the output chute into the waiting fibreboard container. In passing through they break the light beam and thus cause a count to be registered.

This electronic equipment is designed and manufactured by Electronic Machine Co. Ltd., Mayday Road, Thornton Heath, Surrey, from whom further particulars may be obtained.

Magnetic Dip-Stick

The level of liquids in containers can be found very easily by means of a dip-stick, but this simple device is not normally applicable to the closed containers needed for toxic or volatile liquids, or for liquids stored under pressure. An extension of the dip-stick technique to such containers is, however, offered by a new device manufactured by Alan Cobham Engineering Ltd., Blandford, Dorset.

A tube is sealed into the container, with an open upper end accessible from the outside, and a closed lower end below liquid level. A ring magnet encircles the tube, being carried on a float so that its level marks that of the liquid surface. A dipstick having a small magnet at its lower end can be inserted into the open end of the tube, and mutual attraction between the magnets ensures that the liquid level will be readable on the calibrated stick. An interesting feature is that the device can be installed upside down, so that levels can be found by inserting the 'dip-stick' from the bottom of the container.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from 'The Trade Marks Journal'—given below are reproduced by permission of the Controller of H.M. Stationery Office.

Wayfarer (805,581). Rubber and artificial rubber, all for use in the manufacture of footwear. Morris Rubber Industries Ltd., Greyhound Works, Byfleet, Surrey. (Class 17; July 12 1961.)

Vylastic (815,843). Chemical preparations included in Class 1 for use in the coating of surfaces. Plastic Coatings Ltd., Woodbridge Industrial Estate, By-Pass, Guildford, Surrey. (Class 1; July 19 1961.)

Cascoset (817,905). Adhesive substances used in industry. Leicester, Lovell and Co. Ltd., St. Christopher's Works, North Baddesley, Southampton, Hampshire. (Class 1; July 19 1961.)

Oasis (814,452). Foamed plastics included in Class 17 for holding flowers in vases or in the like receptacles. The V. L. Smithers Manufacturing Co., Marvin Avenue, Kent, State of Ohio, USA. Address for service is c/o J. E. Evans-Jackson and Co., 49 Albert Hall Mansions, Kensington Gore, London, S.W.7. (Class 17; July 19 1961.)

compri-band

(814,888). Elastic foamed material impregnated with bitumen and with like substances, being for use in padding and jointing and hermetically sealing. Asbiton A.G., 7 Seefeldstrasse, Zurich (8), Switzerland. Address for service is c/o Haseltine, Lake and Co., 22 Southampton Buildings, Chancery Lane, London, W.C.2. (Class 17; July 19 1961.)

Pillow (817,927). Inflatable rubber tanks. The Goodyear Tire and Rubber Co., 1144 East Market Street, Akron, State of Ohio, USA. Address for service is c/o Marks and Clerk, 57 and 58 Lincoln's Inn Fields, London, W.C.2. (Class 17; July 19 1961.)

(815,109). Self-adhesive transparent foils of plastics included in Class 17. Gertrud Schwarz, Kunstoffe, Werke Altenbruck, Post. u. Bahn Untereschbach, Berzirk, Cologne, Germany. Address for service is c/o Haseltine Lake and Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2. (Class 17; July 19 1961.)

BDP

(808,012). Titanium dioxide (not being a pigment. British Titan Products Co. Ltd., Billingham, County Durham. To be associated with No. 808,013 (4326, 982) and others. (Class 1; July 26 1961.)

Elvax (815,437). Synthetic resins in powder or granular form, for use in manufacture. E. I. du Pont de Nemours and Co., 1007 Market Street, Wilmington, State of Delaware, USA. Address for service is c/o Marks and Clerk, 57 and 58 Lincoln's Inn Fields, London, W.C.2. (Class 1; July 26 1961.)

Uni-Bond (B815,017). Adhesives for use in industry. The Liquitile Supply Co. Ltd., 48 High Street, Camberley, Surrey. (Class 1; July 26 1961.)

Polylite (818,648). Anti-oxidants being chemical preparations for use in the manufacture of rubber. United States Rubber Co., Rockefeller Centre, 1230 Avenue of the Americas, New York, State of New York, USA. Address for service is c/o T. A. Clayton, 62 and 64 Horseferry Road, London, S.W.1. (Class 1; July 26 1961.)

Cirrus (818,360). Imitation leather, and articles made therefrom, included in Class 18. Bernard Wardle (Everflex) Ltd., Caernarvon, North Wales. (Class 18; July 19 1961.)

Riltube (811,589). Containers in tubular form, included in Class 20, made of plastics and for use in the transport and storage of materials in liquid or paste form. Organico, 23 Avenue Franklin D. Roosevelt, Paris, France. Address for service is c/o Mewburn Ellis and Co., 70/72 Chancery Lane, London, W.C.2. (Class 20; July 19 1961.)

Oroglas (803,353). Moulding powders being synthetic resin thermoplastics. Rohm and Haas Co., 222 West Washington Square, City of Philadelphia, State of Pennsylvania, USA. Address for service is c/o Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London, W.C.2. (Class 1; July 26 1961.)

Contirol (801,398). Plastics included in Class 17 in the form of corrugated sheets. C.L.D. Ltd., 7-8 Great Winchester Street, London, E.C.2. (Class 17; July 26 1961.)

Propylex (B801,771). Polypropylene plastics in the form of sheets, bands, strips, films, plates, slabs, blocks, bars, rods, tubes or cylinders, and included in Class 17. British Celanese Ltd., Celanese House, 22 and 23 Hanover Square, London, W.1. (Class 17; July 26 1961.)

Aquamaster (815,839). Garden pools made of fibreglass. The Simplex Dairy Equipment Co. Ltd., Sawston, Cambridgeshire. (Class 19; July 26 1961.)

Baryfol (814,074). Building slabs made of plaster, felt, mineral wool, glass wool, jute or of textile fabrics, and bonded with plastics, rubber, artificial rubber or bitumen, or with mixtures of the aforesaid materials. Dr. Alois Stankiewicz Gesellschaft Mit Beschränkter Haftung, Adelheidsdorf (Kreis Celle), Germany. Address for service is c/o Haseltine, Lake and Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2. (Class 19; July 26 1961.)

Decro-Wall (805,562). Wall-hangings made of moulded plastics. Rubber Improvement Ltd., Rilex House, Chandos Street, London, W.1. (Class 27; July 26 1961.)

Cycolac (799,514). Synthetic resins for use in manufacture. Borg-Warner Corporation, 200 South Michigan Avenue, Chicago 4, State of Illinois, USA. Address for service is c/o J. A. Kemp and Co., 14 South Square, Grays Inn, London, W.C.1. (Class 1; August 2 1961.)

'CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

Owing to ever increasing production costs, the publishers of RUBBER & PLASTICS WEEKLY regret that they are compelled to make a slight increase in their charges for Classified Advertisements.

As from October 1 1961, all headings other than Auctions and Tenders will be 8d. per word. Minimum 12s. Box No. 2s. extra.

The charge for Auctions and Tenders will be 5s. 6d. per line. Minimum 38s. 6d.

APPOINTMENTS VACANT

6d. a word, Minimum 12/6 Box 2/-

A TECHNICAL REPRESENTATIVE who can read drawings, if possible with some knowledge of moulded sponge (although this is not essential) is required by a Midlands firm with an expanding business for sponge. No applicant can be considered unless he has had some years of training in a rubber factory. This is a position which would be very suitable for a comparatively young man with experience who is now desirous of taking up a permanent post with a progressive firm.—Write, in confidence, giving full details of age, experience and salary required, to Box 003. (003)

APPOINTMENTS VACANT

(continued)

DUE to considerable expansion of sponge department an experienced chemist and a technician are required to assist in development and control. Good welfare schemes and conditions.—Apply stating experience and salary required to Box 462. (462)

EXPERIENCED Hose Design Engineer required, preferably 25 to 35 years. The position offers excellent opportunity for advancement for man experienced in the design of all types of wrapped ply, horizontal and long length braided hose. Excellent facilities: Canteen, Sports and Pension Scheme.—Apply Employment Manager, The Goodyear Tyre and Rubber Co. (G.B.) Ltd., Bushbury, Wolverhampton. (004)

FOREMAN required, fully experienced in the compounding of synthetic rubbers and should have first-class knowledge of all aspects of calendering. This will be a permanent progressive position in a rapidly expanding department and the selected applicant will be responsible to the existing Departmental Superintendent. Applicants should have held a similar supervisory position and had a number of years' experience in the above processes.—Please write, giving details of age, experience, salary, etc.—Box 496. (496)

SUPERVISOR required for moulding department producing general rubber mouldings. Applicants should have had experience.—Write stating age, experience and present salary to: Emsa Rubber Works Ltd., Paterson Street, Blackburn, Lancs. (011)

APPOINTMENTS VACANT

(continued)

QUALIFIED Chemist/Rubber Technologist required to take charge of Laboratory and Factory Process Control. Permanent position with good Salary and Pension Scheme.—Write giving details of experience, etc. to Managing Director, The Stalybridge Rubber Co., Ltd., Ashton-under-Lyne, Lancs. (010)

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6d. a word. Minimum 10/- Box 2/-

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MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

NEW 'Parnavac' 2620 Vacuum Forming Machine for sale. Fully automatic. Maximum forming area 26in. x 20in. Drawing depth 0-13¾in. Power consumption 7½kW.—F. J. Edwards Ltd., 359 Euston Road, London, N.W.1 or 41 Water Street, Birmingham 3. (008)

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(continued)

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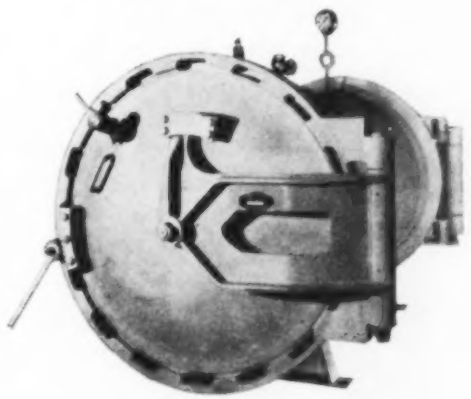

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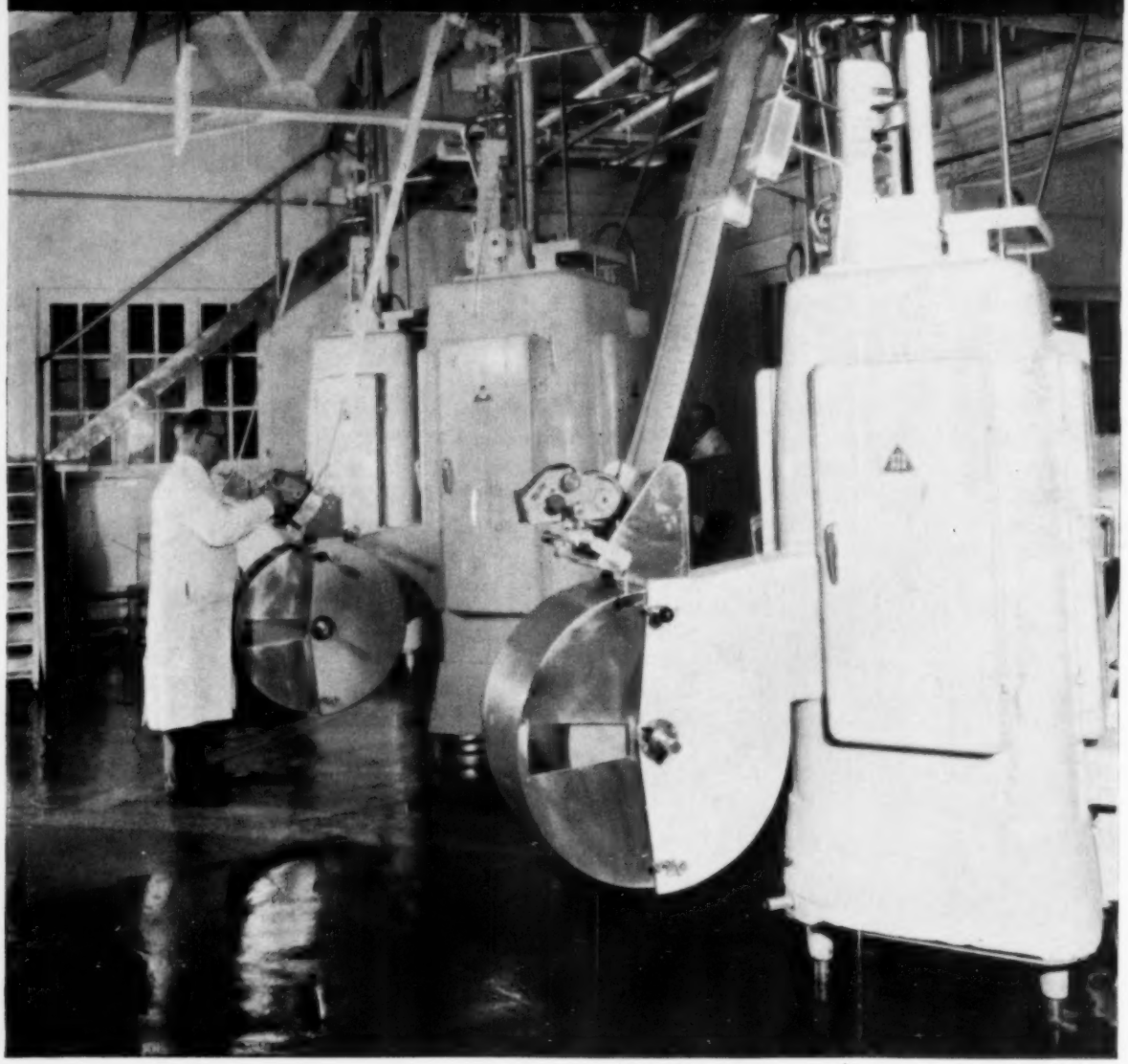

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